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VERMONT NEW HAMPSHIRE

NEW JERSEY

RHODE ISLAND

MASSACHUSETTS

CONNECTICUT

WATERBURY

CAPE COD

BAY

LONG ISLAND SOUND

MAP OF THE RAILROADS OF THE STATE OF MASSACHUSETTS

ACCOMPANYING THE REPORT OF THE
RAILROAD COMMISSIONERS.

1887.

EXPLANATION

Red Line — Main Line
Blue Line — Branch Line
Black Line — Other Lines

Scale of Miles
0 10 20 30

Printed by the State Printer, Boston, Mass.

NINETEENTH ANNUAL REPORT

OF THE

BOARD OF RAILROAD COMMISSIONERS.

JANUARY, 1888.

THE BOARD OF RAILROAD COMMISSIONERS,
HOLDING THEIR ANNUAL MEETING AT
THE STATE HOUSE, BOSTON,
ON JANUARY 1, 1888.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
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1888.

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Part I.

COMMISSIONERS' REPORT.

Commonwealth of Massachusetts.

The Railroad Commissioners respectfully submit their Nineteenth Annual Report.

RAILROAD CONSTRUCTION.

During the year ending Sept. 30, 1887, there were constructed the following additional miles of railroad in this State : —

Central Massachusetts (Jefferson's to Ware),	26.170
Providence, Webster & Springfield,	1.260
Boston, Winthrop & Shore (Winthrop Branch), . . . . .	.860
Eastern (Essex Branch Extension), . . . . .	.520
Boston & Albany (Riverside Branch Extension), . . . . .	.040
	<hr/>
	28.850

And there was a decrease by a re-measurement on several roads of, .100

Additional miles,	<hr/>	28.750
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MILEAGE OF RAILROADS.

The total length of railroads belonging to the corporations making returns to this Board was 2,992.823 miles of main line and branches, of which 1,036.717 were provided with double track. Last year the total length was 2,867.613 miles, with 1,011.367 miles of double track; showing an increase of 125.210 of total length, and 25.350 miles of double track. The total length of sidings was 1,360.009 miles, as against 1,249.862; showing an increase of 110.147 miles. The total length of track, considering double track and sidings as so much additional single track, is 5,389.549 miles, as against 5,128.842 of last year; the increase being 260.707 miles. Of the whole amount there are in this State, of main line 2,018.258 miles, of double track 740.389, and of sidings 964.330 miles, being a total of 3,722.977, as against 3,616.103 miles of last year; showing an increase of track in this State of 106.874 miles.

COST OF ROADS.

The average cost of standard-gauge roads is returned at \$69,877.01 per mile; the cost of equipment per mile operated averages \$5,487.38, — making the average cost of a standard-gauge road, with equipment, \$75,364.39. This increase over last year is accounted for by the cost of the Troy & Greenfield Railroad and Hoosac Tunnel, which was purchased from the State by the Fitchburg Railroad Company for ten million dollars in securities, being now included in the cost of the Fitchburg Railroad, while in previous years no returns were made to the Board or was there included in any of their computations any sum for the tunnel and railroad property of the State. The cost of narrow-gauge roads averages \$33,789.57 per mile, and \$7,208.23 per mile additional for equipment.

NUMBER OF CORPORATIONS.

Returns were received from sixty corporations, — the same as last year. The Dorchester & Milton and the Lancaster have been dropped from our list. The Chatham and the Hoosac Tunnel & Wilmington Companies, having been incorporated the past year, have been added.

CAPITAL STOCK AND DEBT.

The aggregate capital stock was \$150,469,414.02, an increase of \$19,781,445.00, resulting from an increase of the capital stock of the following roads: —

Fitchburg,	\$15,484,500 00
Eastern,	3,149,400 00
Providence & Worcester,	500,000 00
Boston & Lowell,	400,000 00
Old Colony,	200,000 00
Chatham,	66,195 00
Central Massachusetts,	59,230 00
New York & New England (preferred),	50,000 00
Providence, Webster & Springfield,	25,000 00
Grafton Centre,	20,170 00
New York & Boston Inland,	12,240 00
Boston, Winthrop & Shore,	12,000 00

The capital stock of the Hanover Branch, amounting to \$123,950, and of the Dorchester & Milton, amounting to \$73,340, have been dropped from our accounts; both of

these companies' roads having been incorporated into the accounts of the Old Colony as branches.

The net debt of the companies—the gross debt less cash assets—amounts to \$81,646,094.60, an increase of \$10,633,-597.11. The cash assets of all the railroad companies of the State have increased by the amount of \$4,000,351.63. The returns for the last seven years are as follows:—

YEARS.	Stock.	Net Debt.
1881,	\$122,155,614 12	\$64,850,890 76
1882,	122,976,262 26	71,913,806 00
1883,	122,367,572 27	72,933,290 93
1884,	127,668,390 27	74,439,473 75
1885,	128,551,658 54	73,706,622 04
1886,	130,687,969 02	71,012,497 49
1887,	150,469,414 02	81,646,094 60

GROSS INCOME.

The total gross income of these corporations for the year is \$53,650,438.27, an increase of \$4,334,617.77, being an increase of 8.8 per cent.

The following table gives a comparison for seven years:—

YEARS.	Gross Income.	Increase from Previous Year.	Per cent. of increase.
1881,	\$37,764,395 83	—	—
1882,	40,846,370 10	\$3,081,974 27	8.1
1883,	43,380,387 63	2,534,017 53	6.2
1884,	43,119,302 70	261,084 93*	0.6*
1885,	44,623,350.35	1,504,047 65	3.5
1886,	49,315,820 50	4,692,470 15	10.5
1887,	53,650,438 27	4,334,617 77	8.8

The total expenses—including rents paid—of all the corporations amounted to \$40,417,503.92, an increase of \$4,530,-264.74. The net income was \$13,232,934.35, being a decrease of \$195,646.97. The passenger earnings were \$25,285,736.69, an increase of \$1,954,410.98 over the year 1886, when they amounted to \$23,331,325.71. The freight earnings were \$24,-782,921.65, an increase of \$1,942,558.12 over those of last year, which amounted to \$22,840,363.53.

* Decrease.

The local passenger earnings were \$17,009,841.66, an increase of \$1,236,118.54 over the figures of last year, which were \$15,773,723.12. The through passenger earnings were \$5,950,080.34, an increase of \$548,478.11 over the amount for last year, which was \$5,401,602.23. The express, mail, and other earnings included in total passenger earnings, as given above, amounted to \$2,325,814.69, being an increase of \$169,814.33, this item having been, in 1886, \$2,156,000.36. The local freight earnings were \$11,621,372.13; in 1886 they were \$10,929,413.10, showing an increase of \$691,959.03. Through freight was \$13,034,633.12, against \$11,852,778.57, an increase of \$1,181,854.55.

The income from all other sources of the freight department amounted to \$126,916.40, as against \$58,171.86, an increase of \$68,744.54. The following table gives the earnings in strictly railroad business during the past ten years:—

YEARS.	Total Transportation.	Increase or Decrease from Previous Year.	Percentage.
1877-78,	\$28,003,236 41	—	—
1878-79,	29,152,829 02	\$1,149,592 61	4.10
1879-80,	33,661,822 69	4,508,993 67	15.40
1880-81,	35,936,302 87	2,274,480 18	6.75
1881-82,	39,094,369 25	3,158,066 38	8.79
1882-83,	41,635,800 39	2 541,431 14	6.50
1883-84,	41,456,977 30	178,823 09*	0.43*
1884-85,	41,742,340 99	285,363 69	0.69
1885-86,	46,171,689 24	4,429,348 25	10.61
1886-87,	50,068,658 34	3,896,969 10	8.40

The following tables show the passenger and freight earnings for the past ten years, and the comparative amount of passenger and freight mileage during the same period:—

YEARS.	Passenger Earnings.	Freight Earnings.
1877-78,	\$12,949,970 76	\$13,782,724 66
1878-79,	13,035,047 44	14,813,337 69
1879-80,	14,532,368 06	17,741,746 39
1880-81,	17,328,495 48	18,607,807 39
1881-82,	19,567,274 71	19,527,094 54
1882-83,	20,602,289 13	21,033,511 26
1883-84,	21,207,200 42	20,249,776 88
1884-85,	21,549,369 27	20,192,971 72
1885-86,	23,331,325 71	22,840,363 53
1886-87,	25,285,736 69	24,782,921 65

* Decrease.

Passenger and Freight Mileage.

YEARS.	Total Passenger Mileage.	Total Freight Mileage.
1877-78,	593,060,781	715,480,187
1878-79,	616,871,131	806,064,933
1879-80,	708,645,422	959,429,750
1880-81,	788,422,761	1,080,802,796
1881-82,	892,321,207	1,130,070,652
1882-83,	943,245,658	1,220,824,418
1883-84,	1,007,136,376	1,229,368,472
1884-85,	1,041,628,073	1,266,160,455
1885-86,	1,124,148,045	1,391,626,438
1886-87,	1,242,031,078	1,517,932,012

The increase of passenger mileage — or passengers carried one mile — for the year amounts to 117,883,033. The increase of freight mileage, or tons of freight carried one mile, amounts to 126,305,574. The total number of passengers carried was 82,923,364, showing an increase of 7,080,783 over the previous year. The whole number of tons of freight carried was 24,605,140, as against 22,925,532; showing an increase of 1,679,608 tons.

EARNINGS PER MILE OF ROAD.

The average sum earned on each mile of main track and branch operated was \$12,117.29; or, computing double track as additional single track, the average per mile was \$9,688.21. The average transportation earnings per mile, on the seven roads of standard-gauge terminating in Boston, was \$11,580.58, being a decrease of \$24.10 per mile.

COST OF OPERATING.

The following table shows the cost of operating the roads during the past ten years, and the percentage of operating expenses, not including taxes, as compared with gross receipts: —

YEARS.	Cost of Operating per Mile of Road.	Percentage of Operating Expenses to Gross Receipts.
1877-78,	\$7,319 51	69
1878-79,	6,576 75	65
1879-80,	7,786 00	68
1880-81,	8,146 15	68
1881-82,	8,603 10	69
1882-83,	9,192 56	71
1883-84,	8,062 12	66
1884-85,	7,460 50	62
1885-86,	8,147 84	63
1886-87,	8,416 72	64

GROSS AND NET INCOME.

The total gross and net income of all the corporations for ten years, and the percentage of gross and net income compared with the permanent investments, were as follows:—

YEARS.	Total Gross Income.	Percentage to Permanent Investments.	Net Income.*	Percentage to Permanent Investments.
1877-78, .	\$29,053,008 76	17.0	\$9,232,811 98	5.4
1878-79, .	30,312,964 54	17.5	10,154,013 86	5.8
1879-80, .	35,140,374 77	19.5	11,191,815 53	6.2
1880-81, .	37,764,395 83	19.9	10,701,751 60	5.6
1881-82, .	40,846,370 10	20.5	19,902,202 95	5.5
1882-83, .	43,380,387 63	21.8	10,900,479 92	5.4
1883-84, .	43,119,302 70	20.4	11,048,618 19	5.2
1884-85, .	44,623,350 35	20.8	12,118,974 88	5.7
1885-86, .	49,315,820 50	23.0	13,428,581 32	6.3
1886-87, .	53,650,438 27	21.9	13,232,934 35	5.4

The net income of 1886-87 was earned by the several corporations in the following proportions as compared with their permanent investments:—

11 companies with	\$2,966,000	permanent investment	had no net income.
14 " "	95,426,000	" "	" $3\frac{1}{2}$ per cent or less.
12 " "	12,417,000	" "	" $3\frac{1}{2}$ to $5\frac{1}{2}$ per cent.
8 " "	46,424,000	" "	" $5\frac{1}{2}$ to $7\frac{1}{2}$ "
8 " "	54,076,000	" "	" $7\frac{1}{2}$ to $9\frac{1}{2}$ "
3 " "	33,569,000	" "	" over $9\frac{1}{2}$ per cent.
56 " "	\$244,878,000	" "	" net income † of 6.9 per cent.

* Gross income less total expenses and rents.

† Rents not deducted.

DIVIDENDS.

The total amount of dividends declared was \$7,550,901.61, an increase of \$693,395.31 over last year. Of the 60 corporations, 36 paid dividends varying from 2 to 10 per cent. The following table shows the amount paid in dividends by all the corporations for ten years, with the percentage to capital stock, and also the amount of interest paid : —

YEARS.	Amount Paid in Dividends.	Percentage to Total Capital Stock.	Interest Paid.
1877-78,	\$5,589,927 40	4.68	\$3,126,925 34
1878-79,	5,264,431 78	4.30	3,172,990 59
1879-80,	5,987,718 64	5.05	3,423,752 25
1880-81,	6,287,866 82	5.15	3,748,292 55
1881-82,	6,271,139 86	5.10	4,291,222 59
1882-83,	6,379,721 10	5.21	4,756,085 23
1883-84,	6,535,054 92	5.12	4,729,328 56
1884-85,	6,551,704 15	5.10	4,767,095 88
1885-86,	6,857,506 30	5.33	4,810,019 68
1886-87,	7,550,901 61	5.02	4,880,512 85

AMOUNT OF BUSINESS.

The annual passenger and freight movement on all the roads, for ten years, appears in the following tables : —

YEARS.	No. of Passengers Carried.	No. of Passengers Carried One Mile.	Average Distance Travelled.
1877-78,	37,318,427	593,060,781	15.85
1878-79,	39,217,634	616,871,131	15.73
1879-80,	45,151,152	708,645,422	15.70
1880-81,	49,834,491	788,422,761	15.82
1881-82,	55,868,694	892,321,207	15.97
1882-83,	61,530,747	943,245,658	15.33
1883-84,	66,517,265	1,007,136,376	15.29
1884-85,	69,603,700	1,041,628,073	14.97
1885-86,	75,842,581	1,124,148,085	14.82
1886-87,	82,923,364	1,242,031,078	14.98

YEARS.	Tons Freight Carried.	Tons Freight Carried One Mile.	Average Distance each Ton was Carried.
1877-78,	12,186,545	715,480,187	58.65
1878-79,	14,401,877	806,064,933	56.00
1879-80,	17,221,567	959,429,750	55.70
1880-81,	17,971,072	1,080,802,796	60.14
1881-82,	19,061,164	1,130,070,652	59.29
1882-83,	20,202,881	1,220,824,418	60.43
1883-84,	20,273,920	1,229,368,472	60.64
1884-85,	20,577,096	1,266,160,455	61.53
1885-86,	22,925,532	1,391,626,438	60.70
1886-87,	24,605,140	1,517,932,012	60.88

The miles run by passenger and freight trains, and the total miles run by all trains for the past ten years, were as follows : —

YEARS.	MILES RUN BY —		
	Passenger Trains.	Freight Trains.	All Trains.
1877-78,	10,301,893	9,266,252	21,438,329
1878-79,	10,792,629	8,974,993	22,755,910
1879-80,	11,350,716	9,809,975	24,975,392
1880-81,	12,413,290	10,398,539	27,205,783
1881-82,	13,636,169	10,598,126	29,052,800
1882-83,	14,244,658	11,382,154	31,150,823
1883-84,	15,157,425	11,282,338	32,304,333
1884-85,	16,212,988	11,722,667	34,168,999
1885-86,	17,268,159	12,303,808	36,441,043
1886-87,	18,522,488	13,057,794	39,391,079

COST OF RUNNING TRAINS.

The average cost of running trains one mile during this year on all roads reported has been \$0.883. The cost (not including taxes) of running each train mile for the past eight years was as follows : —

Cost per Total Train Mile.

1879-80,	\$0.902	1883-84,	\$0.895
1880-81, . . . .	.810	1884-85, . . . .	.813
1881-82, . . . .	.863	1885-86, . . . .	.845
1882-83, . . . .	.949	1886-87, . . . .	.883

The following table shows the cost, not including taxes, for five years per total train mile to each of the leading corporations of the State :—

	COST PER TOTAL TRAIN MILE.				
	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.
Boston & Albany, . . .	\$1.003	\$0.927	\$0.819	\$0.933	\$0.967
Boston & Lowell, . . .	.830	.781	.650	.680	.706
Boston & Maine, . . .	.964	.900	.805	.805	.807
Boston & Providence, . .	1.275	1.220	1.158	1.216	1.563
Eastern, . . . . .	.838	.818	—	—	—
Fitchburg, . . . . .	.887	.800	.748	.753	.805
New York & New England,	.922	.932	.839	.834	.823
Old Colony,	1.008	.879	.863	.909	.935
Connecticut River, . . .	.998	.936	.906	.967	1.020
New York, New Haven & Hartford, . . . . .	.981	.968	.898	.937	1.016
Providence & Worcester, .	1.026	1.072	.961	.994	.930

The cost of certain specified items of train service per total train mile for the last six years is divided as follows :—

	1882.	1883.	1884.	1885.	1886.	1887.
Repairs of road-bed, . .	\$0.125	\$0.133	\$0.122	\$0.118	\$0.122	\$0.125
of bridges, . . . . .	.017	.024	.024	.023	.025	.022
of rails, . . . . .	.028	.030	.021	.015	.015	.013
of locomotives, . . .	.061	.066	.060	.054	.056	.054
of passenger cars, . .	.096	.092	.039	.035	.039	.041
of freight cars, . . .	.141	.138	.043	.035	.047	.048
Wages, . . . . .	.279	.287	.283	.268	.272	.284
Oil and waste, . . . .	.011	.011	.010	.008	.007	.007
Fuel, . . . . .	.121	.124	.111	.094	.091	.095
Totals,	\$0.879	\$0.905	\$0.713	\$0.650	\$0.674	\$0.689

The earnings for each revenue-train mile, for each passenger-train mile, and for each freight-train mile, on eleven of the principal roads in the State during the past five years, are given in the following tables :—

	EARNINGS PER TOTAL REVENUE-TRAIN MILE.				
	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.
Boston & Albany, . . .	\$1.638	\$1.542	\$1.406	\$1.596	\$1.628
Boston & Lowell, . . .	1.674	1.451	1.199	1.139	1.225
Boston & Maine, . . .	1.709	1.587	1.541	1.580	1.584
Boston & Providence, . .	1.838	1.749	1.715	1.763	1.802
Eastern,	1.648	1.580	—	—	—
Fitchburg,	1.532	1.394	1.324	1.337	1.417
New York & New England,	1.320	1.360	1.466	1.638	1.646
Old Colony,	1.668	1.685	1.723	1.727	1.730
Connecticut River, . . .	1.855	2.080	1.691	1.828	1.914
New York, New Haven & Hartford,	1.804	1.772	1.767	1.886	1.876
Providence & Worcester, .	2.013	1.832	1.962	2.110	2.192

	EARNINGS PER PASSENGER-TRAIN MILE.				
	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.
Boston & Albany, . . .	\$1.990	\$1.824	\$1.733	\$1.783	\$1.754
Boston & Lowell, . . .	1.047	1.071	.954	.888	.978
Boston & Maine, . . .	1.513	1.402	1.373	1.402	1.407
Boston & Providence, . .	1.563	1.499	1.471	1.527	1.542
Eastern,	1.458	1.420	—	—	—
Fitchburg,	1.132	1.011	.965	.924	.978
New York & New England,	.988	1.018	1.074	1.161	1.191
Old Colony,	1.477	1.444	1.415	1.398	1.402
Connecticut River, . . .	1.253	1.593	1.112	1.239	1.305
New York, New Haven & Hartford,	1.821	1.835	1.726	1.815	1.756
Providence & Worcester, .	1.555	1.221	1.560	1.591	1.566

	EARNINGS PER FREIGHT-TRAIN MILE.				
	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.
Boston & Albany, . . .	\$1.433	\$1.359	\$1.199	\$1.465	\$1.530
Boston & Lowell, . . .	3.547	2.266	1.519	1.469	1.536
Boston & Maine, . . .	2.145	2.029	1.904	1.944	1.941
Boston & Providence, . .	2.579	2.498	2.451	2.450	2.674
Eastern,	1.998	1.880	—	—	—
Fitchburg,	1.892	1.768	1.728	1.792	1.915
New York & New England,	1.652	1.729	1.966	2.216	2.154
Old Colony,	1.997	2.177	2.450	2.562	2.562
Connecticut River, . . .	3.066	2.639	3.060	3.167	3.286
New York, New Haven & Hartford,	1.775	1.670	1.844	2.014	2.109
Providence & Worcester, .	2.513	3.205	2.426	2.734	3.122

FARES AND FREIGHTS.

The four following tables show the average fares on all roads, the average fares and freights for eight years on the leading roads, and the change in average rate of freight on six roads since 1865 :—

Average Fare on all Roads in the State.

1879-80.	1880-81.	1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.
\$0.0224	\$0.0220	\$0.0200	\$0.0201	\$0.0192	\$0.0187	\$0.0188	\$0.0185

Average Fares for Six Years.

	FARES.					
	1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.
	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
Boston & Albany, . . .	1.99	2.08	1.91	1.84	1.85	1.88
Boston & Maine, . . .	1.95	1.97	1.90	1.74	1.80	1.83
Boston & Providence, . .	1.96	1.88	1.88	1.84	1.87	1.85
Old Colony,	2.00	2.00	1.87	1.70	1.70	1.50
Boston & Lowell, . . .	1.67	1.94	2.12	2.04	2.06	2.13
Fitchburg,	1.71	1.77	1.65	1.83	1.75	1.89
Eastern,	1.88	1.82	1.72	—	—	—
New York & New England,	2.09	2.46	2.01	1.93	2.02	2.07
Connecticut River, . . .	2.48	2.36	2.37	2.34	2.42	2.42
New York, New Haven & Hartford,	1.81	1.98	1.96	1.94	1.92	1.77
Providence & Worcester,	2.12	2.14	2.12	2.08	2.10	2.10

Average Freights for Six Years.

	FREIGHTS.					
	1882.	1883.	1884.	1885.	1886.	1887.
	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
Boston & Albany,	1.07	1.20	1.09	0.94	1.10	1.10
Boston & Maine,	2.35	2.24	2.34	2.13	2.27	2.22
Boston & Providence, . . .	2.83	2.83	2.82	2.83	2.84	2.93
Old Colony,	3.04	3.16	3.00	2.90	2.93	2.90
Boston & Lowell,	2.60	2.98	2.33	1.77	1.67	1.71
Fitchburg,	1.18	1.19	1.09	1.06	1.07	1.13
Eastern,	2.03	1.92	1.81	—	—	—
New York & New England, .	1.77	1.38	1.41	1.71	1.67	1.63
Connecticut River,	3.07	3.04	3.05	2.96	2.81	2.92
New York, New Haven & Hart- ford,	1.98	1.89	1.96	1.96	2.00	1.95
Providence & Worcester, . .	2.78	2.96	3.09	2.45	2.49	2.55

Average Rates of Freight, 1865 and 1887.

	Rate 1865. Cents.	Rate 1887. Cents.	Per cent. of 1865 to 1887.
Boston & Albany,	3.90	1.10	28
Boston & Maine,	4.58	2.22	48
Boston & Providence,	4.38	2.93	67
Connecticut River,	6.20	2.92	47
Fitchburg,	4.10	1.13	28
Old Colony,	3.20	2.90	91

STEEL RAILS.

During the year, 329.527 miles of steel rail were laid as against 237.434 laid last year, making the whole amount now laid 3,903.167 miles; being nearly 97 per cent. of the total of main line, including double track and branches. The amount of steel rail laid each year for six years is shown in the following table:—

	1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.
Steel rail (miles), .	331	308	347	215	237	329

ROLLING STOCK.

The increase in the number of locomotives during the year has been 105, and of passenger cars, 133; mail and baggage cars have increased 46; freight and miscellaneous cars have increased 2,881.

The following table shows the amount of rolling stock returned for the last seven years:—

	1880-81.	1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.
Locomotives, .	1,161	1,222	1,286	1,391	1,416	1,445	1,550
Passenger cars, .	1,568	1,658	1,790	1,948	1,993	2,058	2,191
Mail and baggage cars, .	432	463	482	525	509	518	564
Freight cars, .	24,502	26,382	28,008	29,701	29,957	31,319	34,200

EMPLOYEES.

The average number of persons employed by the railroad corporations was 34,200, being 2,881 more than in the year before. The following table shows the number employed for each of the past eight years:—

1879-80, . . .	21,615	1883-84, . . .	30,590
1880-81, . . .	25,490	1884-85, . . .	30,069
1881-82, . . .	27,403	1885-86, . . .	31,188
1882-83, . . .	29,844	1886-87, . . .	34,200

The whole number employed by all the corporations making returns to this Board is 39,422.

STREET RAILWAYS.

Returns were received from 44 street railway companies. During the year five have been incorporated and added to the list,—the Suburban, West End, Plum Island, Worcester Consolidated and the Union. The Worcester Consolidated was incorporated under a special act, being a consolidation of the Worcester and Citizens' Companies. The Union is a consolidation of the Acushnet and New Bedford & Fairhaven

Companies under a special act. The Salem & Danvers has been purchased by the Naumkeag. The name of the Stoneham Company has been changed by a special act to East Middlesex. The Charles River, Highland, Middlesex and Salem Companies, having been consolidated or purchased by other companies, have been dropped from our list.

The aggregate capital stock is \$10,096,800.00, being an increase of \$971,155.00; their gross debt has also increased \$982,978.29, and now amounts to \$6,447,707.90. The aggregate of stock and gross debt is now \$16,544,507.90.

One corporation made a dividend of 13 per cent., two of 10, three of 8, one of $6\frac{1}{2}$, ten of 6, two of 4, five of 3, one of $2\frac{1}{2}$; while nineteen declared no dividends.

The average rate of dividend on the total amount of capital stock was 5.26 per cent.; and the net earnings amount to 5.56 per cent. on the aggregate of capital stock and gross debt.

The whole length of track, including branches, sidings, and double track, amounts to 507.085 miles, being an increase of 66.950 miles. The average cost was \$17,628.37 per mile for permanent way, \$8,334.57 for equipment, and \$8,685.86 for land and buildings; making a total cost of \$34,648.80 for each mile of road owned. The number of round trips was 3,222,607, an increase of 344,602 over the previous year; with a mileage of 20,625,846, an increase of 964,171. Passengers were carried to the number of 124,787,328, being an increase of 12,699,944 over the number carried during the preceding year. The number of passengers carried on the street railways exceeded the number on the steam roads by 41,863,964.

The gross income was \$6,459,524.80, an increase of \$580,941.75. There was a decrease of net income of \$107,614.17; with an increase of dividends paid amounting to \$36,850.00.

The average amount received for the conveyance of each passenger was 5.18 cents, and the average cost of carrying each person amounted to 4.44; the net profits to the companies being 0.74 cent, against 0.87 cent as compared with last year. The average cost of a round trip was \$1.72, with a profit of 28 cents, being a decrease of 7 cents from last year.

The whole number of horses was 11,874, being an increase of 1,085; the number of cars was 2,633, showing an increase

- The property of the Cambridge Railroad was transferred
November 19.

of 344, and the number of other vehicles was 148. The number of persons employed on street railways was 5,222, being an increase of 607 over last year. The number of accidents reported was 131, of which eight were fatal. The number injured the previous year was 86; nine of whom were killed.

West End Street Railway.

The duties of the Commission, with reference to street railways, have been increased during the past year. By chapter 413 of the Acts of 1887, being an act to authorize the West End Street Railway and certain other street railway companies to unite and consolidate with each other, it was provided that the terms and conditions of leases, purchases, sales and consolidations under the act should be such only as may be approved by the Board of Railroad Commissioners, and under this act the Board was called upon to approve, and after examination did approve, the terms of sale of the property of the Cambridge, the Metropolitan, the South Boston and the Boston Consolidated Street Railway companies to the West End Street Railway Company. The property of those corporations, in accordance with such terms of sale, was on November 12 transferred to the West End Street Railway Company, and all of said properties are now operated under one management.

Section 3 of said chapter 413 authorizes the West End Street Railway Company to increase its capital stock as provided by the laws of the Commonwealth and also to such an amount as the Board of Railroad Commissioners may determine to be necessary or expedient to carry into effect the provisions of the act. Section 5 provides that the company may locate, construct and maintain tunnels between convenient points in the city of Boston, after obtaining the consent of the board of aldermen and of the Board of Railroad Commissioners. This section seems to impose upon the Board the duty to pass, not only upon the location of the tunnel, but upon its expediency and method of construction. Section 8 provides that no location and no alteration, or revocation of a location of a street railway, and no authority to run cars over or use the tracks of another street railway, whether surface or elevated, in the city of Boston, or Cambridge, or in the town of Brook-

line, shall hereafter be valid until approved by this Board. When the act was under consideration the chairman of the Board appeared before the committee on Street Railways, and called the attention of the committee to the additional labor which the act imposed upon the Board, and urged that it might be relieved therefrom. The duties of the Board with reference to steam railroads alone are at best arduous and varied, and open a wide field of investigation which it is exceedingly difficult to do justice to, and the Board regrets that the Legislature deemed it necessary or expedient to throw upon it additional labor of so important and troublesome a character with reference to street railways. The power given by section 8 is practically a veto power in regard to locations and alterations, or revocations of locations, and thus the Board may be brought in conflict with the city authorities upon matters on which they have, after a public hearing, previously acted, and which have always been deemed to be within their special province.

In the year 1882 an appeal from the County Commissioners to this Board was given in decisions relating to separations of grades. In the report for 1885 the Board called attention to the matter, urging that such second trial was contrary to the general policy of our law, and that the law was further objectionable, because it allowed an appeal from the appropriate tribunal to one less familiar with the considerations involved. In accordance with the recommendation of the Board, the provision allowing an appeal was by the Legislature of that year repealed. As in that case, so in the matter of locations of street railways, the Board believes that there should be no second trial, or at least that it is not the proper tribunal before which a second trial should be had.

The decision of the Board in reference to the petition of the West End Street Railway Company, asking for authority to increase its common stock from \$80,000 to \$1,200,000, will be found in the Appendix. This decision covers several important questions as to increase of capital, and also as to the character of the restrictions which can be imposed by the board of aldermen of a city or by the selectmen of a town, under Public Statutes, chap. 113, sect. 7.

It was held, that the authority to grant a location, under such

restrictions as the interests of the public may require, does not contemplate or authorize a sale of a location for a sum of money or other valuable consideration, or a grant of a location upon condition that land shall be contributed for the widening of a street. An examination of the reports of this Board does not lead to the discovery of any instance of a sale of a location. In the case of the Middlesex Railroad Company a portion of its location was granted on condition that rates within certain limits should not exceed three cents. The company accepted the location but refused to submit to the condition on the ground that it was illegal, and the condition was never enforced. In a decision, embodied in the report of the year 1882, page 122, it is stated with reference to this condition that the general opinion of the legal profession is, that a municipal board has no right to annex such a condition to the grant of a location, and the Board expressed its concurrence in that opinion.

In relation to the power of street railway companies to purchase real estate the Board held that section 18, which authorizes every street railway company to purchase and hold such real and personal estate as may be necessary or convenient for the operation of its road, does not authorize a street railway company to purchase land to be contributed to the widening of a street, no part of such land being used for the railway tracks.

The question may soon arise whether a street railway company can legally purchase land outside of streets, for the purpose of constructing its tracks thereon. In connection with the Harvard Bridge, so called, over Charles River, another new question is imminent, — namely, whether it is within the corporate powers of a street railway company to join with a city or town in paying the expense of the construction of a bridge, over which a location has been granted to it.

The expediency of legislation covering these two matters deserves consideration.

Consolidations.

As in the case of steam railroads so among street railway companies, an unusual number of consolidations has been made during the past year. The Worcester and the Citizens'

Street Railway Companies have been consolidated under the name of the Worcester Consolidated Street Railway Company. The Acushnet and the New Bedford & Fairhaven Street Railway Companies have been consolidated under the name of the Union Street Railway Company. The Salem & Danvers Street Railway Company has been purchased by the Naumkeag Street Railway Company. The Metropolitan Railroad Company, the Boston Consolidated Street Railway Company (which was formed by a consolidation of the Highland Street Railway Company and the Middlesex Railroad Company), the South Boston Railroad Company and the Cambridge Railroad Company (which was formed by a consolidation of the Charles River Street Railway Company and the Cambridge Railroad Company) have been consolidated into the West End Street Railway Company. Thus there is now one railroad in the city of Boston, operating the lines formerly operated by six different corporations.

The advantages and disadvantages of consolidation of competing lines have often been discussed in these reports. An interesting claim is made, with reference to the advantages to follow from a consolidation of the street railway companies in the city of Boston, and deserves mention. It is, that under the old system each one of the six railways was obliged to take an active part in the politics of the city, in order to protect its rights from encroachments in the interest of other railways. It is now claimed that, as there will be no other railway to encroach, the city elections will be more free from this dangerous corporate influence.

STEAM RAILROADS.

Leases and Consolidations.

During the past year the following leases and consolidations have been effected:—

The New Haven & Northampton Railroad Company, the Connecticut Valley Railroad Company, the Stamford & New Canaan Railroad Company, and the Naugatuck Railroad Company, have been leased to the New York, New Haven & Hartford Railroad Company for the term of ninety-nine years.

The Boston & Lowell Railroad has been leased to the Boston & Maine Railroad for ninety-nine years, and the Manchester & Lawrence Railroad has been leased to the Boston & Maine Railroad for fifty years.

The Milford & Woonsocket Railroad and the Milford, Franklin & Providence Railroad have been leased to the New York & New England Railroad Company, and an agreement for a lease of the Boston & Providence Railroad to the Old Colony Railroad Company for the term of ninety-nine years has been entered into, subject to the approval of the Legislature and thereafter of the stockholders of the respective roads.

The Hanover Branch Railroad has been purchased by the Old Colony. The Dorchester & Milton Railroad, which many years ago became the property of the Old Colony, has ceased to be recognized as a separate organization and has been incorporated into the Old Colony, and the Troy & Greenfield and Hoosac Tunnel, the Boston, Hoosac Tunnel & Western, and the Troy & Boston Railroads have been consolidated with the Fitchburg Railroad Company.

The Troy & Greenfield Railroad.

The annual hearing by the Board, under the contract with the Fitchburg Railroad Company for operating the State road, showed the following result for the year ending Sept. 30, 1886:—

Gross revenue,	\$569,910 78
Gross earnings,	531,487 93
Expenses,	260,698 96
Balance due the State,	270,788 97
Amount already paid the State by the Fitchburg R.R. Co., .	262,897 03
Amount due the State by the Fitchburg R.R. Co.,	7,891 94

The operating expenses are 49.051 per cent. of the gross earnings, against 49.477 the previous year. This percentage applies by contracts to the other railroad companies engaged in operating the State road.

The Fitchburg Railroad Company claimed as expenses \$273,909.54, which would have entitled it to 51.536 per cent. of the gross earnings.

ACCIDENTS.

The record of accidents for the year ending Sept. 30, 1887, is even more lamentable than that of the preceding year, though that far exceeded the average in the number of casualties. Ten collisions and eight derailments caused the death of 28 persons and injured nearly 200. These accidents were investigated by the Board and special reports on the most serious will be found in the Appendix.

The whole number of persons injured (as reported to the Board at the time the accidents occurred) was 802, an increase of 211 over last year, due in a great measure to the Bussey Bridge disaster. Of these, 198 were passengers, 357 were employees, 54 were travellers at highway crossings and persons lawfully at stations, and 193 were trespassers, who were unlawfully on the track or stealing rides on freight trains. The number of passengers killed or injured was larger than last year by 84, and there were 83 more casualties to employees; an increase of more than 73 per cent in passengers, and 30 per cent in employees. There were ten more persons killed or injured at grade crossings and stations, and 34 more trespassers suffered the penalty of their offence.

Of passengers 23 were killed and 121 were injured by causes beyond their own control; while 14 were killed and 40 were injured through their own misconduct or want of caution, a slight decrease in the total casualties of this class from the preceding year. There is a discrepancy in the number of passengers injured in the Bussey Bridge disaster as returned at the time of the accident and the number reported in the annual return of the Boston & Providence Railroad. The number first reported was 100, but by the annual return the number known and claiming to have been injured was more than 200. A large part of this excess is probably made up of indefinite, uncertain, and perhaps imaginary injuries. The table of accidents in the Appendix is compiled from the reports made at the time the accidents occurred.

Of the casualties to employees 79 were fatal and 278 were not fatal. Eleven were killed and 111 were injured when coupling or uncoupling freight cars. Eight of these accidents

occurred where one of the couplers was an authorized automatic coupler, 1 where both couplers were authorized automatic couplers of the same kind, and 5 occurred in coupling passenger cars equipped with the Miller hook to freight cars having the link and pin draw-bar. Four employees were killed and 6 were injured by contact with overhead bridges or other structures less than eighteen feet above the track; 6 were killed and 26 injured by train accidents; 24 were killed and 50 were injured by falling from trains; and 34 were killed and 85 were injured by accidents from a great variety of causes. Most of them were due to crossing or standing on tracks or incautiously stepping in front of a moving engine or car in railroad yards, or jumping from moving trains.

At grade crossings of highways protected by gates or flagmen there were 17 casualties, and at crossings without gates or flag there were 30; of these 19 were fatal and 28 not fatal. This is a decrease of 3 fatal accidents and an increase of 15 not fatal. Three persons were killed and four were injured when imprudently crossing the tracks at stations.

Trespassers as usual furnish the largest number of fatal casualties, 126 having been killed while 67 were injured not fatally. Last year 91 were killed and 68 were injured. Of the trespassers killed 11 are reported as apparently suicides. Twenty-six were reported as intoxicated at the time of the accident, and it is not improbable that others who were killed while lying on the track were in a like condition. It appears also from the reports that eight of the passengers killed or injured through their own imprudence were under the influence of liquor.

If all the companies adopt the same rule in reporting accidents, there is a great difference in the number of actual casualties on the several roads in proportion to their traffic. In the case of passengers killed and injured through their own fault there are no sufficient data on which to base a comparison, as we do not know the number of passengers carried in Massachusetts. The following table shows the ratio of passengers injured to the miles operated in Massachusetts, but as some roads carry more passengers than others on the miles operated within the State, the comparison is not accurate.

RAILROADS.	Miles Operated in Massachusetts.	Passengers Injured by their Own Fault.	Ratio.
Boston & Albany,	332	7	1 to 47 miles.
Boston & Lowell,	191	5	1 to 38 "
Boston & Maine,	262	16	1 to 17 "
Boston & Providence,	57	2	1 to 28 "
Fitchburg,	227	12	1 to 19 "
New York & New England,	109	1	1 to 109 "
Old Colony,	460	7	1 to 65 "
Four Southern roads,	958	17	1 to 56+ "
Three Northern roads,	680	33	1 to 20+ "

The old Colony Railroad, being almost wholly within the State, affords the fairest ratio of passengers injured to miles operated. It will be seen that the proportion of such accidents to miles operated is much less on the four roads entering the city on the south side than on those entering on the north side. This is also true in comparing these casualties with the total number of passengers carried — being 1 to 1,920,881 on the south side roads, and 1 to 933,002 on the north side roads. The ratio would be still more favorable to the south side roads on the basis of total passengers carried within the State on the several roads. The question arises whether the passengers on the south side roads are more careful than those on the north side roads, or are better guarded from the results of their own imprudence, — or if the accidents are as fully reported.

There is a similar difference in the reported accidents to employees, and it is evident that the several roads do not adopt the same rule as to what casualties shall be reported. While some report slight injuries both to passengers and employees, others report only those which are fatal or very serious. The Boston & Albany and the Fitchburg report many accidents to employees while coupling or uncoupling cars, while the Boston & Providence reports no accident of that kind, and the Old Colony but three. Many of the injuries reported by the former roads are comparatively slight, and it does not seem probable that the employees of the Boston & Providence and the Old Colony escape the minor accidents of

bruised thumbs and broken fingers which occur so frequently on the Boston & Albany and the Fitchburg roads.

The following table shows the proportion of employees killed and injured to the whole number on the several roads terminating in Boston : —

RAILROADS.	Total Number of Employees.	Number Killed and Injured.	Ratio.	Per Cent.
Boston & Albany,	5,698	96	1 in 59	.017
Boston & Lowell,	4,066	41	1 in 98	.010
Boston & Maine,	5,017	33	1 in 152	.006
Boston & Providence,	1,011	5	1 in 202	.004
Fitchburg,	3,324	82	1 in 40	.024
New York & New England,	3,189	50	1 in 63	.015
Old Colony,	3,517	17	1 in 207	.005

The last railroad year makes an unfortunate comparative showing in accidents to passengers from causes beyond their own control. The proportion of killed and injured to the total number of passengers carried was — killed, 1 in 3,605,-363; injured — 1 in 685,317. This is, with one exception, the highest ratio for any year in the last decade, as shown by the following table : —

Passengers Killed and Injured from Causes beyond their own Control.

YEAR.	Killed.	Injured.
1878,	0 in 37,318,427	1 in 18,659,213
1879,*	1 in 2,246,522	1 in 232,057
1880,	1 in 45,151,152	0 in 45,151,152
1881,	1 in 12,458,622	1 in 7,119,213
1882,	1 in 55,868,694	1 in 18,622,898
1883,	0 in 61,530,747	1 in 2,563,781
1884,	1 in 3,482,952	1 in 1,160,984
1885,	0 in 69,603,700	1 in 5,800,308
1886,	1 in 7,584,258	1 in 2,166,931
1887,	1 in 3,605,363	1 in 685,317

None of these tables, however, are satisfactory for purposes of comparison, because, while the number of accidents given

* The Wollaston accident occurred in October, 1878, and is included in the statistics for the year ending Sept. 30, 1879.

include only those in Massachusetts, the number of passengers carried include all carried outside of, as well as within, the State; and the number of employees includes all employed on the whole length of the roads operated by the several companies. In the case of passengers, if we had the number carried in Massachusetts we should find the exact ratio; and in the case of employees, if we had the number employed in Massachusetts and the freight train mileage within this State, comparisons between the several roads would be more fair.

From the monthly record of train accidents in the United States, published in the Railroad Gazette, a general statement in tabular form is given in the Appendix. This record is not official and is probably not complete, but is sufficiently accurate for general information and for ordinary purposes of comparison. The table of causes of accident in each month is discontinued as of little practical value.

BUSSEY BRIDGE DISASTER.

The Appendix contains the special report made to the Legislature of last year in relation to the Bussey Bridge disaster, so called, on the 14th of March last. Among the concluding paragraphs of that report is the following:—

The disaster and the facts which have been disclosed impose a grave responsibility on the Board of Directors. It is their duty by the most searching inquiry to ascertain forthwith whether any other work has been done in a like negligent and incompetent manner, whether in other matters reasonable and well-approved precautions against accident have been ignored or neglected, and whether false economy has been practised and safety sacrificed. They should not rest until they have taken the most energetic measures, without regard to expense and without regard to persons, to correct the past and to ensure better and safer management in the future.

On the 25th of November the Board sent a communication to the president and directors of the Boston & Providence Railroad, asking them to report what action had been taken by them in consequence of the findings and recommendations contained in the report of the Board, in relation to the disaster. The following answer has been received:—

Boston, December 13, 1887.

HON. GEORGE G. CROCKER, *Chairman of the Board of R. R. Commissioners.*

SIR:—In your communication of the 25th of last month the directors were requested to report on or before the 15th of December what action had been taken in consequence of the findings and recommendations of your Board in the matter of the Bussey Bridge disaster.

Previous to the publication of the Commissioners' report, which bears no specific date, Mr. Samuel L. Minot, a well-known civil engineer of this city, was asked by the directors to take charge of all bridges on the line of the road. In the month of May he was formally appointed an officer of the corporation.

In accordance with Mr. Minot's recommendation work was continued for the completion of two important bridges, the plans for one of which met with his full approval. Plans for the other were somewhat changed at his suggestion.

Under Mr. Minot's supervision seven highway and eighteen track bridges have been strengthened or renewed, or are in the course of renewal. The details relating to track bridges were filed in the office of the Commissioners on the 31st of October last.

The sums expended on bridges during the last twelve years and in doing away with open bridges by solid filling, the latter large outlay charged to track account, indicate that there has been no parsimony shown by the corporation in caring for this most important feature of a railway.

Owing to inevitable drawbacks the work proposed for this year has not gone on as speedily as was hoped for.

The breaking down of the Roslindale Bridge led to a demand upon the iron bridge builders of the country which they have not been able to meet.

Materials promised to this road in October will not be delivered before the twentieth of the current month of December. It is proposed, however, to continue work during favorable days or weeks of the winter.

Although referring to details not within your jurisdiction, it seems proper to add that the bridges falling to the special care of this corporation in Rhode Island have been thoroughly inspected and cared for. In the city of Pawtucket a stone bridge or arch over the Mos-hassuck River, similar to that about completed at Roslindale, is well under way. The cost is to be borne jointly by the Providence & Worcester Railroad and this Company.

Respectfully submitted for the directors,

HENRY A. WHITNEY, *President.*

The foregoing letter is not as full as it was hoped it would be. In commendation of the company it should be stated that through its instrumentality the location of South Street, in the vicinity of the Bussey Bridge, has been changed so that it now crosses under the tracks at a right angle, and that the stone arch which has been erected to take the place of the fallen bridge is a substantial and satisfactory structure.

TRAIN ACCIDENTS.

It is important that this Board should be notified at once, by telegraph or telephone, of any serious train accident. The examination of a wreck before it has been disturbed renders the investigations into the causes of the accident much less difficult. It is true that the wreck may be burned, and that in many cases, even when notice is given immediately, it will be necessary, before any member of the Board can arrive on the scene, to clear away the wreck for the passage of trains, to replace sleepers, frogs and rails, and perhaps break up shattered cars so as to get them out of the way, and that important features may thus be lost sight of. It should be made the duty of some official, after attending to the wounded, to make a rough diagram of the wreck, showing the locations of the different parts of it with reference to each other and surrounding objects, such as trees, rocks, telegraph poles, houses, etc.; and also a brief, general description of the condition of its different portions.

Great assistance in investigating the causes and details of the Bussey Bridge disaster was rendered by the numerous photographs which were taken. Amateur photography is now so common, and the process so simple, that it seems not unreasonable to request that railroads, in connection with their wrecking apparatus, should have a photographing outfit, and that they should, when possible, cause photographs to be taken of the wreck from several points of view, so that the exact position of it with reference to surrounding objects, and the condition and position of the cars, bridge or other debris, may be clearly shown. No legislation upon this subject is necessary, as the railroads will undoubtedly comply with the expressed wish of the Board.

INVESTIGATIONS AND INQUESTS IN CASES OF DEATH.

By section 18 of chapter 112 of the Public Statutes the Board is required to investigate the "causes of any accident on a railroad resulting in loss of life." By section 13 of chapter 26 of the Public Statutes it is provided that "an inquest shall be held in all cases of death by accident upon a railroad," in the same manner as in the case of deaths caused by violence. Such an inquest is held by a justice of the district, police or municipal court for the district or city in which the body lies, or by a trial justice.

It is further provided in said chapter that the district attorney, or some person designated by him, may attend the inquest and examine all witnesses, and that he or the justice may issue subpœnas for witnesses. Section 15 provides that "the presiding justice or trial justice shall, after hearing the testimony, draw up and sign a report in which he shall find and certify when, where and by what means the person deceased came to his death,—his name, if known, and all material circumstances attending his death; and if it appears that his death resulted wholly or in part from the unlawful act of any other person or persons, he shall further state the name or names of such person or persons, if known to him, and he shall file such report with the records of the Superior Court in the county wherein the inquest is held."

The statutes therefore require two independent investigations to be made in all cases of death by accident upon a railroad. The object of the inquest, as clearly shown in the statute, is to find out whether any crime has been committed. If such is found to be the case provision is made for arrest and indictment. The object of the investigations by the Board of Railroad Commissioners is different from that of the inquest. Its purpose is to find out the cause of the accident with a view to taking such steps and making such recommendations, or securing the passage of such legislation, as may be calculated to prevent the recurrence of similar accidents. The character of the investigation of course differs with its object, but inquests by a judge and investigations by a board of railroad commissioners have always many features in common, and, moreover, the inquest may show that the accident was of such a nature that

it could not be further guarded against. The inquest and investigation, therefore, duplicate each other to a considerable extent, and in order to save this work from being done twice the suggestion is made that a law be passed requiring, in cases of death by accident on a railroad, a verbatim report of the evidence given at the inquest to be made and forwarded forthwith to the Board of Railroad Commissioners. To this end it should be made the duty of the justice or district attorney to secure the attendance of a short-hand reporter, and it seems reasonable that the expense attending the taking and writing out of the testimony should fall upon the railroad companies either collectively, as in the case of other expenses of the Board of Railroad Commissioners, or upon the railroad company upon whose line the accident happened. It is believed that the railroad companies would not object to incurring this expenditure, inasmuch as it would enable them at the office of the Board of Railroad Commissioners to find a correct statement of the testimony as given at the inquest. This Board, having received the report of the evidence, as taken at the inquest, could then conduct such further investigations as seem to it desirable. It is, of course, not intended that the Board shall, in all cases, await the report of the testimony taken at the inquest before making any investigations into an accident. It is the intention of the Board to make an examination without delay in all cases in which evidence is likely to be lost or distorted unless taken at once. In many cases, however, especially in those happening in remote portions of the State, the report of the evidence given at the inquest will be very valuable and instructive, and in fact, being taken by a justice familiar with the neighborhood and the people in the vicinity, may develop features which the Board would otherwise fail to discover.

GRADE CROSSINGS.

The number of crossings of railroads by public ways at grade, according to the returns, is 2,128, of which 765 are protected by gates or flagmen.

In the report made in January, 1885, the Board, under a resolve calling upon it to examine and report upon the subject of providing for the gradual abolition of grade crossings in cities and the populous parts of towns, entered into a full dis-

cussion of the dangers attendant upon grade crossings, and the difficulties in the way of their abolition, and suggested certain amendments of the law, most of which were incorporated in chapter 194 of the Acts of that year. That act improved and simplified the law, and in connection with chapter 295 of the Acts of last year provided for an equitable distribution of the expense of separating grades. There were, however, two suggestions made in that report which have failed to be incorporated in legislation. One suggestion was, that some provision should be made by which private crossings could be abolished. The statutes provide the machinery for a separation of grades where a highway or townway and a railroad cross each other on the same level, but there is no provision for a separation of grades in the case of, or for closing up, a private crossing. The Board suggested that it was worthy of consideration "whether railroad corporations ought not to be allowed to call upon the county commissioners for a right to abolish a private crossing, upon paying damages, to be assessed by them, with an appeal to a jury either as to damages alone, or as to the discontinuance and of damages." These private crossings are in many cases an unnecessary source of danger to the travelling public. There are no statistics showing how many persons have been injured or what accidents have happened at private crossings. The number is probably small, but the opportunities are numerous, and the elements which lead to serious accidents are involved. Moreover, it is not an unusual thing for the use of a private crossing to become so general and so great that it is desired to make it a public street. Thus, that which is one year overlooked as insignificant becomes, in the course of years, a serious evil.

There is a large number of these crossings in the Commonwealth, and the Board renews the recommendation made in 1885 that some provision may be made so that railroads, upon paying the owner for the damage done to him, may be allowed to close up a private way under such restrictions and safeguards as the circumstances may seem to require. Some of the railroads possessed of a progressive spirit, and disposed to provide for the future, would undoubtedly be willing to incur the expense in order to avoid the danger, while others would need to be urged on to take a step which would

involve them in expense, and would relieve them only from such dangers as are consequent upon other people's carelessness. If a railroad, in order to promote the safety of the travelling public, is willing to pay for the damage to private property caused by closing up a private way, assessed by a jury, which would be likely to give the owner of the land very full compensation, it ought to be allowed to do so.

In the report of January, 1885, the Board suggested that the county commissioners might in each case be required by law to determine whether the private crossing ought to be abolished, but the reasons for placing greater limitations on the right to stop up a private way than are placed upon the right of a railroad to take the land itself are believed to be more imaginary than real.

The other suggestion made in the report of 1885, and renewed in the report of last year, was that, in case of the laying out of a town or highway over an existing railroad, some provision should be made for a division of the cost of separating grades between the cities, towns and counties interested and the railroad company. The case is very clearly and forcibly stated on pages 43 and 44 of said report of January, 1885, and the Board respectfully calls the attention of the Legislature to the statements and arguments there made.

If there is an existing crossing of a railroad by a public way at grade, provision is made for a division of the cost of separating the grades, so that the railroad company is obliged to pay its share.

If, however, it is proposed to lay out a public way across a railroad, even where a private crossing previously existed, there is no provision for dividing the expense of avoiding a grade crossing.

If a grade crossing is established the railroad company may be put to the expense of protecting the crossing by gates and a gatekeeper, or by a flagman, and will incur liabilities for damages in case of accidents. The cost of protecting a grade crossing is at least five or six hundred dollars a year, or the equivalent of five per cent. on ten thousand or twelve thousand dollars. A railroad company could therefore pay this sum towards the expense of separating the grades, and would be better off than it would be with a

grade crossing. The cost would be no more per year, and the company would be relieved from the annoyance, the danger and the possible damages to which a grade crossing would subject it.

The Board recommends that in cases where it is proposed to lay out a highway or a townway across a railroad, provision should be made for a division of the extra expense of separating grades between the cities, towns or counties benefited, and the railroad company, as it could be divided if a public crossing at grade had been established, and it was desired to abolish it.

During the past year a case which strongly demonstrated the importance of carrying out this suggestion of the Board came up, and a full report upon it may be found in the Appendix. The case was based upon the petition of the Street Commissioners of the city of Boston, setting forth that they had laid out Beachmont Avenue as a public street across the tracks of the Boston, Winthrop & Shore Railroad, in East Boston, and asking the consent of the Board to a crossing at grade. The disadvantages and dangers of permitting a grade crossing at such a point are stated at length in the report, and seem to the Board to be conclusive. On the other hand it was urged that at this point a private crossing already exists, which neither the railroad nor any Board has the right under the existing laws to discontinue, that the city cannot pay the whole expense of separating the grades, not having sufficient funds available for that purpose, and that the assent of the Board to a crossing at grade would not increase existing dangers, while its refusal would not in any way diminish them, and practically would simply prevent a much travelled way from being put into good and safe condition, and so kept at the expense of the city. If a division of the cost of separating the grades could have been enforced, it is probable that this private grade crossing would have been abolished. It was certainly reasonable that the railroad company should bear a portion of the expense, because a largely used private crossing existed when the railroad was constructed.

This Beachmont Avenue decision, which called attention to the fact that the travel over that avenue is largely pleasure travel going to the beaches in the summer, and that people on

pleasure bent are peculiarly liable to run heedlessly into danger, was dated November 22; and only two days afterwards, on November 24 (being Thanksgiving Day), a party of four men in a carryall, on a pleasure drive in the city of Newton, drove on to the tracks of the Boston & Albany Railroad, breaking through the closed gates, were struck by an express train and three out of the four were killed.

The report of the presiding justice, Hon. John C. Park, upon the inquest held in this case, after stating the finding "that no blame attaches to any one," continued as follows:—

And here the duty of the Court, strictly speaking, ends.

But, whereas, it appeared that at this grade crossing of a much travelled public highway in that city there is but a single person in the Company's employment whose duty is to raise and lower bar-gates on both sides across said highway, which bar-gates when lowered on each side meet in the centre, and cover a width of eighty-five feet, and upon which, after dark, there is suspended on each side of the road but a single globe glass lantern encased in wire; and, whereas, it also appeared that there is no person with or without a flag or signal on the side opposite to which the gate-keeper stands, the Court takes occasion to suggest that the provision for the protection of the public at this crossing is hardly adequate, although it may be all that the Railroad Commissioners require.

If instead of a single lantern in the centre of a bar covering a space of eighty-five feet the traveller was confronted by a row of four lanterns affixed to the bars, about fifteen feet apart, the warning would be more conspicuous and effective. Or if an additional man was stationed on the side opposite to the gate-keeper, the protection of the public would be more assured.

These suggestions are commended to the consideration of the corporation and the Railroad Commissioners.

The foregoing suggestions are well-founded. This Board goes farther. It believes that a more radical remedy is needed at this crossing, and it calls the attention of the Legislature to its decision in the case of the petition of the Newton Street Railway Company, embodied in the Appendix, in which the recommendation is made that an act be passed requiring a separation of grades not only at this crossing but at two other crossings in the city of Newton.

About three-eighths of all the injuries and deaths at grade

crossings happen at those crossings which are protected by gates or by a flagman. The total number killed and injured in this State last year, at grade crossings, was forty-seven, of which seventeen were at crossings protected by gates or by a flagman. Grade crossings on single track roads are dangerous, on—double track roads they should seldom be permitted,—on four track roads never.

The multiplication of tracks, and the increasing number of fast freight and passenger express trains have driven this question of the abolition of grade crossings out of the domain of expediency into the domain of necessity.

STATIONS.

The Boston & Albany deserves the credit of having outstripped all the other roads in furnishing convenient, commodious and attractive stations. Not only has it built many new stations which are admirable examples of what a station should be, but its general average of excellence is very high. It is to be further commended for its systematic efforts and success in keeping its station grounds in good order, and pleasantly ornamented with shrubbery and flowers. This part of the work has not been left to the accidental taste of a station agent, but is a regularly organized department of the service of the road. The work costs so little, contributes so much to the pleasure of the travelling public, and wins so much favorable comment, that it is commended to the other companies as a judicious expenditure, fairly within the province of the duties of a railroad company in such a community as this. Several of the roads in the matter of stations seem to err on the side of unwise economy. The stations on the Providence & Worcester Railroad especially are not such as its passenger traffic demands and its financial condition warrants.

On single track roads, doing a small amount of business, it is a convenient and usual plan to place the station at a point where the highway crosses the track. So long as only a single track is used the arrangement works well enough and is not specially dangerous. When a second track is put in, the danger that people crossing the tracks diagonally to the highway will be struck by a passing train becomes serious. This danger is greatly increased when the road becomes a four track

road, and calls imperatively for a remedy at some of the stations near Boston on the Boston & Albany and Boston & Providence Railroads. It is not unusual for an express train to dash by the stations on these roads when the passengers, having just left a local train, are hurrying across the tracks in all directions, seeking only the shortest way to their homes, or their business. Accidents must happen, if the present condition of affairs is allowed to continue. Platform gates on the cars are valuable in preventing the passengers from leaving the cars on the wrong side, but something should also be done to prevent a passenger from running into danger after he has left the car. The location of the station at a crossing, originally a matter of convenience, has now become both a grave danger and a serious interruption to street traffic.

The danger can be diminished by erecting a fence between the tracks, but the interruption to traffic would then remain unabated. Another way to lessen the danger would be by forbidding the passage of a train by another train which is standing at, or just drawing away from a station; but this remedy would seriously increase the interruption to traffic on the railroad, as well as on the street. The complete remedy can be accomplished either by moving the station farther away from the street and fencing in the tracks, or better still, because it abolishes a grade crossing, by separating the grades.

Legislation upon this subject will be needed unless the railroads deal with it promptly, vigorously and thoroughly.

Union Passenger Station in Boston.

By a series of acts culminating in chapter 302 and chapter 410 of the Acts of last year, provision has been made for the erection of a union railroad passenger station to accommodate the various lines of railroad entering the city of Boston on the north. By said chapter 410 it was provided that the Boston & Maine Railroad, when it shall have leased the franchises and property of the Boston & Lowell Corporation pursuant to chapter 67 of the Acts of the year 1883, shall, as soon as practicable thereafter, cause plans and drawings to be made for a union passenger station on Causeway Street for the use of the said Boston & Maine Railroad, and the Boston & Lowell Railroad, the Eastern Railroad Company, and Fitchburg Railroad

Company, and for such approaches thereto, and such changes and relocations and arrangements of the passenger tracks leading thereto as shall avoid, as far as practicable, the crossings of the passenger tracks of the companies hereinbefore named with each other and with any other railroad or railroads at grade. The act further provides that these plans so prepared shall be submitted to the Fitchburg Railroad Company, which shall have six months to examine the same, at the end of which time the original plans, and, in case they are not agreed to by the Fitchburg Railroad Company, the plans prepared by said company shall be submitted to the Board of Railroad Commissioners, and the orders and directions of said Board, after hearing, shall be binding on all said corporations. The other sections of said act regulate the method of completing the work. This act became a law on the 13th of June last, and no plans have as yet been submitted by the Boston & Maine Railroad to the Fitchburg Railroad Company. In answer to an inquiry made by this Board, Mr. George C. Lord, the president of the Boston & Maine Railroad, under date of Nov. 17, 1887, wrote as follows:—

In answer to your inquiry in regard to what action has been taken by us under chapter 410 of the Acts of 1887, in relation to a union passenger station, I would say that we have employed Thomas Doane, civil engineer, and Messrs. Winslow & Warren, architects, who have been for some time preparing plans, several of which have been presented to us, no one of which as yet seems to meet the requirements; but it is hoped that ere long they will succeed in furnishing plans which we shall be able to adopt.

ROAD-BED, ETC.

Those passengers who think that there is something out of order which should be reported, when a car gets a jerk or snap in going round a curve or over a switch are correct. Tracks can and should be laid and trains should be run so that a car will ride round a curve as smoothly as on a straight line, and if it fails to do so, there is either something the matter with the track or with the car, or the engineer of the train is at fault. There may be no danger,—in most cases there is no danger,—but the jerk shows that something is not as it should be. It is a duty which the passengers owe to themselves and to the

travelling public to see that such cases are reported to the management, and it is the duty of the management to find out exactly what the matter is and have it corrected at once. This statement is made because it has come to the knowledge of the commissioners that in some cases the superintendents or general managers frown upon the making of such reports by passengers and indicate that their suggestions are not desired. The Board believes that the best way for a superintendent to free himself from such complaints is by perfecting his road-bed rather than by endeavoring to restrain passengers from complaining. Such information furnished by passengers may be made of great service to a company, if properly received and promptly acted upon.

On some of the roads there are still many unnecessary and dangerous facing points.

In this matter the Boston & Albany and Old Colony Railroad companies have set an example of thorough work which should be emulated by the other roads.

BRIDGES.

The Bussey Bridge disaster called special attention to the matter of bridges, and, in accordance with recommendations of the Board embodied in its report, chapter 334 of the Acts of last year was passed.

This statute required that the first report by the respective companies should be transmitted to the Board not later than the first of November last; but at that time only a few of the reports had been received, although the railroads had exercised great diligence in their endeavors to comply with the statute. The reports have not all been received even now, but a sufficient number are before the Board to show that the action taken by the Legislature of last year was of great urgency. It is clear that the managements of most of the roads were not sufficiently familiar with the condition of their bridges, and that a large number of the bridges needed extensive repairs, or strengthening, and a considerable number to be entirely rebuilt. The advisability of the passage of the act, and of the action which has been taken under it, is not only amply justified by what has been developed, but is generally, if not universally, admitted by the railroad officials. Under the act the Board appointed Prof. George F. Swain as its expert in relation to bridges, and his report is herewith submitted.

PROFESSOR SWAIN'S REPORT.

DECEMBER 15, 1887.

To the Massachusetts Board of Railroad Commissioners. HON. GEORGE G. CROCKER, Chairman.

GENTLEMEN:— In compliance with your request I beg to submit the following report with regard to what has been done in accordance with the act of Legislature providing for the examination of railroad bridges.

Early in July last the following circular was issued by the Board, requesting railroad companies to furnish, on or before the first day of November, strain-sheets and detail drawings of all track bridges of over ten feet span.

COMMONWEALTH OF MASSACHUSETTS.
BOARD OF RAILROAD COMMISSIONERS,
20 BEACON STREET, BOSTON, , 188 .

————— *Railroad Company.*

SIR,— Your attention is called to the following sections of chapter 334 of the Acts of the present year, being “An Act relating to the Examination of Railroad Bridges:”—

SECT. 1. Every railroad corporation shall, when requested by the railroad commissioners and at least once in two years, have an examination of its bridges and the approaches thereto made by a competent and experienced engineer, who shall report to the corporation the results of his examinations, his conclusions and recommendations, and the corporation shall forthwith transmit a copy of the report to the board of railroad commissioners. The first report shall be made and transmitted to the board not later than the first day of November in the year eighteen hundred and eighty-seven, and subsequent reports shall be made and transmitted at intervals of not more than two years. When a railroad corporation builds a new bridge it shall forthwith have a report in like manner made and transmitted to the board. The reports shall furnish such information in such detail and with such drawings or prints as may be in writing requested by the board of railroad commissioners.

SECT. 3. Nothing herein contained shall be construed to exempt a corporation from making other and more frequent examinations of its bridges and the approaches thereto.

In accordance therewith, the Board of Railroad Commissioners request you to transmit to them, on or before the first day of November next, the following information, plans, etc., relating to the bridge structures on the line of your railroad and its branches, said information, etc., to be given for every bridge structure of over ten feet opening in the clear, between abutments, but not to include highway or street bridges over the road.

I. A statement, in tabular form, giving in order the following data: (1) number of bridge; (2) town in which, and (3) line upon which it is situated; (4) precise location upon the line, if on record; (5) direction

and distance from, and name of nearest station; (6) ordinary name; (7) nature of crossing (stream, street, etc.); (8) number of openings, and clear span of each; (9) length over all; (10) material; (11) general style of bridge; (12) whether deck or through; (13) approximate maximum height of rail above stream, street, etc.; (14) date of erection; (15) names of designer and of builder; (16) by whom erected; (17) whether or not built to definite specifications. On this sheet shall also be stated the weights of the heaviest engines, tenders, and loaded cars at present in use on the road, specifying load on each axle, and distances apart.

This table is preferably not to be a blue print, so that additions can be made to it from time to time, and is to be on one or more sheets of uniform size. Sample sheets for the above returns can be seen at the office of the Board.

II. A "strain-sheet" for each structure, giving,—

- (a) For framed structures, the calculated maximum stress in each piece;
- (b) For plate-girders and beams (including floor beams and stringers of truss bridges), the maximum moment and shear at points not over ten feet apart, including the centre and ends.

The loads to be assumed in making out the strain-sheet are to be either those under IV (a), or the heaviest loads in actual use on the road,—whichever cause the greatest stresses,—and are to be clearly shown or stated on the strain-sheet. The actual loads in use may, if desired, be considered in the calculation as replaced by a *suitable* uniform load headed by a *suitable* concentrated load.

If practicable the information called for under IV (b), (c) and (d) shall all be given on the strain-sheet.

III. Blue prints or drawings showing complete dimensions of each structure, with sections and dimensions of every part, and details of all connections or splices. Scales for drawings to be: (a) for general elevations, cross-sections and plan, not less than a quarter inch to the foot; (b) for all details of connections and splices, and sections of parts, not less than a half inch to the foot, and preferably not less than three-quarters inch to the foot. The complete floor system is to be clearly shown on these drawings.

These sheets, together with the strain-sheet and the table under I, shall be made of uniform size, 28" \times 40", including a margin on the left-hand side of two inches.

IV. For each bridge: (a) If built to definite specifications, a copy of such specifications, together with a statement as to the tests, superintendence, etc., by which they were enforced.

(b) If built without definite specifications, a statement of the source and quality of the material employed, whether any tests were made upon it, together with the results of such tests.

(c) A statement of the frequency with which it has been inspected, and by whom; and, so far as known, the results of any tests applied to it since its erection.

(d) If not given under (a), a statement of the loads for which it was calculated, and of the stresses allowed per square inch under different circumstances.

V. A report by a competent and experienced engineer, as required by section 1 of the Act referred to above, which report shall include the results of his examinations, his conclusions and recommendations, not only in regard to the bridge structure itself, but also in regard to the approaches to the bridge, and the piers and abutments.

Plans not conforming to the above requirements, if already prepared, may be presented to the Board for approval.

GEO. G. CROCKER,
EDWARD W. KINSLEY,
EVERETT A. STEVENS,
Commissioners.

In compliance with your request the said companies have, since that time, been busily engaged in the preparation and calculation of the plans called for. Many of the companies, even some of the largest, had no plans or strain-sheets whatever of the majority of their bridges, and their officials had no certain knowledge of the condition of said structures, except such as would be gained by a superficial examination, while other companies had already on file plans containing nearly all the information called for. Under these circumstances the preparation of the required plans involved, in some cases, a considerable amount of labor, and some of the companies found it impossible to complete them within the time allowed. Your Board, therefore, early in November issued the following circular requesting that the report of inspection called for in the act, together with certain other information, be sent in at once, but allowing until the first of January for the completion of the plans.

COMMONWEALTH OF MASSACHUSETTS.

BOARD OF RAILROAD COMMISSIONERS,
20 BEACON STREET, BOSTON, 188 .

——— *Railroad Company.*

In June last this Board issued a circular requesting railroad companies to prepare and submit, on or before the first day of November, certain plans and other information regarding their bridges. The preparation of these plans, etc., has necessarily involved considerable labor, and several of the companies have stated that they cannot complete them by the date assigned. The Board therefore requests that all of the information called for under sections I and V of the circular referred to, together with as many of the plans, strain-sheets, etc., as possible, be sent in at once, the remainder to be submitted on or before the first of January next. The plans sent in now should, if possible, be those for consecutive bridges on the line.

The Board requests that all plans be made correct to their date, and they further request, in accordance with the act of the Legislature entitled "An Act Relating to the Examination of Railroad Bridges," that notice of all repairs or renewals of existing bridges, which involve any changes in dimensions or modifications in the plans, be transmitted to them within

thirty days after completion, accompanied, where necessary, by new plans. Plans for new bridges should be transmitted to the Board before the erection of the structure. All bridge plans hereafter submitted are to be prepared in accordance with the aforesaid circular regarding bridges.

In section I of said circular, railroad companies were requested to state the "weights of the heaviest engines, tenders and loaded cars at present in use on the road, specifying load on each axle and distances apart." The Board now requests that outline diagrams be sent, showing weights and wheel-spacing for the heaviest engines *of each class in use* on the road. And they further request that such a diagram be sent to them for every new engine of each class in which either the total weight, or the weight on drivers, is increased, or the distance apart of drivers diminished; said diagram to be submitted at least ten days before such engine is put in use.

For the Board,

WM. A. CRAFTS, *Clerk.*

Thus far there has not been a prompt compliance with your requests, and at the date of writing, the reports called for in your second circular have been received only from the following companies, viz.: The Boston & Providence, Old Colony, Fitchburg, New York, New Haven & Hartford, and the New London Northern railroads. Some of the engineers have stated that they desired to defer these reports until the completion of the plans and strain-sheets, in order that they might report more intelligently regarding the condition of the structures, and although the act required that the reports be submitted by the first day of November there seems some justice in allowing further time in most cases. Complete bridge plans have as yet been received from but one of the roads, although many have sent in partial sets.

The complete and critical examination of all these plans must of course require much time, as it is necessary to make a thorough study of each detail. Thus far I have superficially examined the plans as fast as they have been received, with the view of discovering any easily detected defects which may exist, and have then proceeded to a careful examination of the most doubtful structures. As each bridge is examined its characteristic features are entered upon a blank prepared for the purpose, together with notes regarding its condition, as shown by the plans and by the inspection. Any points of weakness or defects of design which are likely to lead to future trouble are also noted, and finally a report will be made to you regarding the bridges on each line. If any serious defects are discovered your immediate attention will be called to them and the proper officials duly notified, and if necessary, a personal inspection of the structure will be made. Reference will hereafter be made to some defective structures which have already been discovered,

and which are either being rebuilt or strengthened. A brief record of the condition of each bridge is also kept in a field note-book, together with facts regarding any alterations or repairs which are made. When the examination of the plans is completed, the Board will be able to turn at once to the proper record book and the proper blank, and find the history of each bridge, with a statement of its present condition and of any defects which may have been detected. When the information now being obtained is thus systematized and recorded it will be comparatively easy to keep informed regarding all the bridges in the State, and it will be necessary to examine only the plans of any new bridges which may be built from time to time. By degrees, also, I hope to inspect personally all the structures of importance.

Although, as stated, the preparation of plans in such detail has involved considerable labor, it was the intention of the Board in preparing their circular to call for nothing which the roads ought not to have on file for their own use, and I think it is very generally recognized that in requiring this information and these drawings the Board has not only not imposed any hardship, but has very properly directed attention to a duty which ought long ago to have been executed.

The failure of the Bussey Bridge on the Boston & Providence Railroad in March last called the attention of railroad companies, in a lamentably forcible way, to the importance of assuring themselves of the condition of their bridges, and has had a most beneficial effect in leading, on almost every road in the State, to the strengthening or removal of doubtful structures. But even such lessons are quickly forgotten, and it has in many cases required the subsequent action of the Board to carry home the moral of that disaster. The preparation of the strain-sheets, as required by the Board, has in some cases brought to light defects and cases of weakness which were entirely unsuspected, and this not on unimportant lines, but on some of the best managed roads in the State, — roads on which it is the uniform endeavor to have everything in first-class condition, and where a bridge which was known to be unsafe or even doubtful would not be allowed to remain for a single day.

But the strain-sheet alone is far from sufficient as a means of judging of the safety of a bridge, and in order to be assured of its condition it is absolutely necessary to have plans of every detail, however small and apparently unimportant. In requiring such detail plans in addition to the strain-sheets, the Board has adopted a most effectual method of ensuring the safety of the bridges of the Commonwealth, and the detection of defects which might otherwise be unsuspected. Leaving out of the question small stringer bridges, it is compara-

tively rare to find a bridge built within ten or fifteen years (and most of the present iron bridges in this State date within that period) which is dangerously weak in its main members. The strain-sheets rarely give any indication of great weakness, and notwithstanding the fact that on account of the rapid increase in the weight of rolling stock many bridges are now subjected daily to loads much in excess of those for which they were designed, thus increasing the strains above what is now considered good practice, yet it is uncommon to find an excess so large as to render the bridge positively unsafe. But it is in the details and in the connections of the various parts that the principal defects are found, and the study of detail plans frequently reveals serious and even startling examples of bad design. Already, in the examination of the plans submitted to your Board, cases of this kind have occurred, and one bridge, built but ten years ago and by one of the largest bridge companies in the country, has been discovered to be so faulty in its details that its immediate strengthening has been undertaken, and it will soon be replaced by a more substantial structure,—and this, even though the strain-sheet showed the main members to be amply strong.

The development of the bridge building business, and especially of the iron bridge building business in this country, has been exceptionally rapid, and the competition extremely great; and although, with native ingenuity, our engineers have adopted details which, in their general plan and arrangement are excellent, yet it is certainly true that in the hurry of business the proper proportioning of those details has not unfrequently been neglected, and the principal attention in the design has been given to the working out of the strain-sheets and the proportioning of the main members, without sufficient regard to the means by which those members were to be connected. Fifteen or twenty years ago bridges were built almost exclusively of wood, and there were not more than two or three firms in the United States who devoted themselves to iron bridge building and did a large business, while to-day there are fifteen or twenty concerns of large capacity doing this class of work. In 1867 the total length of iron bridges in this State was but 651 feet, while the total length of wooden bridges was over 100,000 feet. In 1872 the total length of bridges appears to have been considerably diminished, probably by the filling in and the removal of many short spans, but the total length of iron bridges had increased to 1,581 feet, while that of wooden bridges still exceeded 75,000 feet, the proportion of iron to wood being about two per cent. In that year there was not a single iron bridge on the Fitchburg, Boston & Lowell, Old Colony, and other important roads, and but 125 feet on the Boston & Albany, 222 feet on the Boston & Maine, and 244 on the Eastern; and all the bridges

built in that year by the Boston & Albany, Boston & Lowell, Boston & Maine, Fitchburg, Old Colony, and other long lines, were of wood. In 1877 the total length of iron bridges was about 11,700 feet, having increased to 4,803 feet on the Boston & Albany, 467 feet on the Eastern, 904 feet on the New Haven & Northampton, 1,135 feet on the Old Colony, and 2,126 feet on the (then) Troy & Greenfield. There was still but 163 feet on the Boston & Maine, 80 feet on the Connecticut River, 226 on the Fitchburg and the Vermont & Massachusetts combined, and 202 on the New York & New England; and all of the new bridges built in that year on such lines as the Old Colony and the New York & New England were of wood. The total length of wooden bridges was about 107,000 feet. In 1879, the last year in which returns were made to the Board in this form, the total length of iron bridges was 13,823 feet, having increased to 5,689 on the Boston & Albany, 1,512 on the New Haven & Northampton, and somewhat on other roads, while there was still but 685 feet on the Fitchburg and the Vermont & Massachusetts together. The total length of wooden bridges was about 89,000 feet. Since 1879 the proportion of iron bridges has increased very rapidly, but no figures are at hand to admit of a comparison with previous years. On the Boston & Albany there is now but one wooden bridge on the main line, and on the Fitchburg but very few, so that practically nearly all the bridges on the latter road have been rebuilt in iron since 1877, and on the Boston & Albany since 1873.

When it is remembered that these statistics are for a State in which the total mileage of railroads has increased by 39.6 per cent. since 1867, namely from 1,445.48 miles in 1867 to 2,018.25 miles in 1887, and that the other older States would show similar figures; and when the enormous increase in the mileage of railroads in the middle and western States is considered, some idea will be gained of the great increase and present importance of the bridge building industry. That during such a rapid growth not a few structures should have been imperfectly put together, and under the rapidly increasing weight of rolling stock should prove insufficient, is not remarkable.

New railroad bridges in this State, excepting short stringer bridges, are now almost always built of iron. It is comparatively rare for a new truss-bridge to be built of wood, and the old wooden bridges are gradually being removed and their places supplied by iron structures. Nevertheless, iron bridges as well as wooden bridges have also frequently been found too weak, and have been taken down and replaced by others. It would be very interesting if we could have some statistics regarding the number of iron bridges which have thus been renewed; but although it would give us some idea of the combined results of poor design and increased weight of rolling stock, it

would afford no information regarding the life of a properly designed iron bridge. The questions are frequently asked,—what is the life of an iron bridge?—and how does it compare with that of a wooden or of a stone bridge? It is safe to say that no properly designed iron bridge has yet broken down, or been replaced, on account of its actually wearing out. Iron has as yet been used for bridges for too short a time to enable us to say what its life would be, under proper circumstances. The two causes which have led to the renewal or the failure of iron bridges in the past, are, first, defective design, by which certain parts were overstrained to an extent certain to cause rupture or weakness in time; and second, the rapid increase in the weight of engines and cars during the period since the extensive use of iron for bridges, rendering many structures too weak for the loads of to-day, although at the time of their construction they were well designed and amply strong for the loads then in use.

It is difficult for one who has not critically followed the development of the locomotive to realize how rapidly it has grown to its present huge proportions. Within the memory of men now living a single factory—the Baldwin Locomotive Works in Philadelphia—has gradually but rapidly passed from the “Old Ironsides,” completed in 1832 and weighing something over five tons, to the enormous Decapod locomotives, built within a year, weighing seventy-four tons. Up to the year 1840 the locomotives built at these works had but one pair of driving wheels and weighed not more than thirteen tons, but about that time the necessity for heavier engines for freight traffic began to be felt. New types were developed with two, three and four pairs of drivers, and up to 1860 these engines were built weighing up to about 61,000 pounds or more than 30 tons. The weights continued to increase rapidly, and by 1866 the consolidation type, with four pairs of drivers coupled, had been developed, and engines of this class weighing 90,000 pounds had been built. In 1873 consolidation engines weighing 95,000 pounds (82,000 pounds on drivers) were built for the Mexican Central Railroad, and in 1878 a consolidation engine with water tank on the boiler, weighing 150,000 pounds (100,000 on drivers) and with driving wheels 42 inches in diameter, was built for working a temporary switchback on the New Mexico & Southern Pacific Railroad, the maximum grade being 6 per cent., or over 300 feet to the mile. The loaded tender for this locomotive weighed 44,000 pounds. In 1885 consolidation engines weighing up to 120,000 pounds had been built, and a new type, the Decapod, was developed, having five pairs of drivers coupled. Up to the present time the heaviest consolidation engines built at these works weighed 126,000 pounds, and the heaviest Decapod, 148,000 pounds (133,000 pounds on drivers). These last

engines have drivers 45 inches in diameter, and a driving-wheel base of 17 feet, concentrating therefore nearly 8,000 pounds per foot on the driving-wheel base; the tender weighs 80,000 pounds on four axles. It is evident, therefore, that the increase in the past ten years has been more rapid than ever before, and further figures from the works referred to show that since 1881 the most common types of engines built by them have increased in weight by from 10 to 25 per cent.

The weight of tenders has also increased in nearly like proportion. In 1860 the tank capacity of the largest tenders was from 1,800 to 2,000 gallons, and their weights from 36,000 to 40,000 pounds, while to-day the capacity is from 3,000 to 3,500 gallons, and occasionally reaches 4,000 gallons, the corresponding weights being about 60,000 and 80,000 pounds.

The weights of loaded cars have likewise increased in a startling proportion. Fifteen or twenty years ago the heaviest box freight cars weighed, when loaded, about 42,000 pounds on 31 feet, or about 1,350 pounds per foot; long coal cars weighed about 40,000 pounds on 22 feet, or about 1,800 pounds per foot; and short coal cars weighed 19,000 pounds on 23 feet, or 1,460 pounds per foot. To-day, hopper coal cars are in use in some parts of the country which weigh over 3,600 pounds per foot, and on some of the roads of this State coal cars are run weighing probably over 3,000 pounds per foot; while the heaviest box freight cars to-day weigh not less than 2,400 pounds per foot.

Whether this increase in the weight of rolling stock is to still continue, or whether it has reached its limit, it is impossible to say. Any further increase must necessitate a corresponding increase in the weights of rails, and must lead to still further renewals of bridges; and it would seem as though it would be scarcely economical to go much farther than the point already reached, except in very exceptional cases. But although it is a common opinion among engineers that the future will see but a comparatively small increase, and that the economical limit is about attained, it is impossible to predict with certainty. Assuredly it is wise to build new bridges with an ample margin of strength to allow of a possible increase in the near future.

The engines in use on the roads in the State are not called upon to surmount such heavy grades or to do such arduous duty as in other parts of the country, and the heaviest engines are therefore not found here. Nevertheless, the weights of engines and trains on the roads of this Commonwealth have increased in as great a proportion as elsewhere. The following table gives the weights of the heaviest locomotives and tenders in use on the principal roads of the State since 1873, and it shows that on the trunk lines the weight of engines has increased by from fifty to a hundred per cent. within that period: —

Table Showing the Weights of Heaviest Locomotives and Tenders in use on Massachusetts Roads, since 1873.

	1873.		1875.		1877.		1879.		1881.		1883.		1885.		1887.	
	Loc.	Ten.	Loc.	Ten.	Loc.	Ten.	Loc.	Ten.	Loc.	Ten.	Loc.	Ten.	Loc.	Ten.	Loc.	Ten.
Boston Albany,	30	20	33	20	37	26	37	26	37	30	42	31	43	31	60	33
Boston & Lowell,	—	—	34.7	25	35.9	25.5	35.9	25.5	50.5	31.5	50.5	33.5	50.5	33.5	51.5	33.5
Boston & Maine,	33	20	35	20	35	20.75	35	20.75	37	20.75	37	20.75	48.5	33.5	60	42.5
Boston & Providence,	—	—	—	—	35	25	35	25.5	40	26.5	45.8	29.9	51	33.9	51	33.9
Connecticut River,	27	—	27	22.5	27	22.5	27	22.5	37.8	22.5	39.3	30	39.3	30.	42	30
Eastern,	35	20.3	35	20.3	35	20.3	38.5	27.8	41.4	30.5	41.4	30.5	—	—	—	—
Fitchburg,	35.3	24.8	35	25	40	24	41	25	51	29	51	29	51	34	58.1	35
New Haven & Northampton,	—	—	20	22.2	31.2	22.2	31.2	22.2	31.2	22.2	42	25.6	42	25.6	42	25.6
New London & Northern,	33	24	34	19	34	19	34.	19	41.5	24.5	41.5	24.5	41.5	24.5	44	27
New York & New England (Hartford and Erie),	35	16	35	18	35	25	42	27	60 ?	30	52	33	55	34.5	55	33.5
Norwich & Worcester,	31	17	31	17	31	17	33	22	33	22	45	24	45	24	45	24
Old Colony,	35	20	35	20	35.3	23.8	35.3	25	42.1	25	43	25	46	26	50	33
Providence & Worcester,	33	21	33	21	36	25	36	25	36	25	36	25	36	25	54	32
Worcester & Nashua,	33	19	34	19	36.3	20	55.6	20	55.6	20	55.6	20	60	20	—	—
Housatonic,	—	—	—	—	—	—	30	20	30	20	—	—	30	20	30	20

Enough has been said to make it clear why it has been necessary in so many cases to replace iron bridges by others designed for heavier loads. Although, as has been remarked, even bridges built ten or fifteen years ago seldom show such weakness, in their main members, as to render them positively dangerous, it has already been demonstrated that the preparation of the detail plans will be productive of much good, and will lead to the discovery of points of weakness hitherto unsuspected.

The only bridges thus far brought to my attention which are seriously overstrained, in their main members, are naturally the wooden Howe trusses, often built more than twenty-five years ago, and which, although amply strong at the time they were built, have been entirely outgrown. When we consider the facts which have been alluded to, regarding the increased weight of rolling stock, it will be evident that when built these bridges must have had a considerable excess of strength, otherwise they would scarcely have lived till the present day. Most of them, however, have been strengthened from time to time by adding vertical rods, and a few have had the chords strengthened, while quite a number have been relieved by trestle supports placed under them. The strengthening of the verticals is a common practice and is easily accomplished, but it is not possible to satisfactorily strengthen the chords without almost rebuilding the structure; and it is evident that if such a bridge was properly designed and of equal strength at the start, the chords and connections must now in many cases be particularly weak. Such is not infrequently the case, although fortunately many of these bridges were originally built not of equal strength, but with a very great excess of strength in the wooden members, considering the loads then usual. Besides the increase in the direct strain in the chords, however, the bending strain due to the direct action of the rolling load has so increased that in many cases the total strains are much higher than the proper limit. At the joints and splices, too, the strains are in some cases so large that although there may be no visible indication of weakness their condition is by no means satisfactory. These old bridges must rapidly be replaced by more substantial structures, about whose ability to carry the heavy loads of the present day there shall be no question.

The critical examination of the plans received is now progressing rapidly, and it is expected to complete them during the coming spring and summer. I have already reported to you regarding the wooden bridges on the Providence & Worcester Road, and regarding some of the iron bridges on the Massachusetts Central Road. On the former, two Howe trusses, which have been found to be overstrained, are to be replaced, as soon as possible, with iron bridges,

and other renewals will probably be made before long. On the Massachusetts Central the defective truss bridges, built when the road was first constructed, are to be strengthened, and will be gradually, and it is to be hoped rapidly, replaced with more substantial structures. On the Boston & Providence road an iron pin-connected truss built in 1877 was found to have pins which were entirely too small, some of them being strained to 30,000 pounds or over. This bridge has been temporarily strengthened, and will be replaced by plate girders. On other roads repairs of greater or less extent have been made, not a few of them on account of defects brought to light by the detail plans and strain-sheets. On some lines the condition of the bridge structures already leaves little to be desired, while on others much still remains to be done. It is to be hoped that within a short time the standard of these roads may be so raised as to justify the statement that every railroad bridge in the State is not only not dangerous, but that it is safe beyond a doubt.

All of which is respectfully submitted.

GEORGE F. SWAIN,

Engineer of the Board.

DECEMBER 17, 1887.

THE FLOOR SYSTEM FOR BRIDGES.

In December, 1881, the Board issued a circular with diagrams setting forth the most approved forms of floor construction, and of guard rails and guard timbers for bridges. Six years have elapsed, and although a large amount of work has been done to make bridges conform to the recommendations of that circular, the Board is by no means satisfied with their present condition, as a whole. It is not disputed that the ties should be strong enough and sufficiently close together to carry derailed wheels in safety, and that by spacing blocks, or by notched timbers they should be prevented from being pushed out of place, and bunched together. Nevertheless, there are many bridges in the State in which the tie system is such that it would not carry a derailed car in safety. The Bussey Bridge was one of these, and would probably have gone to pieces whenever a derailed car passed on to it. In the matter of guard rails and guard timbers the bridges are still more defective. Some of the railroad officials dispute the advisability of guard rails, and those who do endorse them differ as to their form. So important has this matter seemed to the Board that it has lately issued to the railroads another circular, en-

dorsing and amplifying the circular of 1881. The bridge disasters, and especially that at the Bussey Bridge, emphasize the importance of this action. Those railroad managers who, from reasons of economy or from lack of realization of the dangers involved, have delayed complying with the recommendations of the Board, are apt to argue, that if there is necessity for guard rails and guard timbers on bridges, the same necessity exists wherever the road runs on an embankment, and that there is no reason for requiring them in one place and not in the other. The difference of conditions is obvious and great. Going down through, or over the side of a bridge, is vastly more dangerous and destructive to human life, than going down the side of an ordinary embankment. The sloping side of an embankment retards and breaks the fall, whereas when a bridge gives way the cars fall practically unimpeded until they strike the roadway or the stony bottom of the river below. The cars are more likely to be piled on top of each other, and the danger of death from drowning is added. But this is not the worst. A bridge has abutments, and in short bridges the dashing of the cars against the opposite abutment is the most terrible and death-dealing horror of all. The accident at the Bussey Bridge shows that the giving way of a short bridge may be more disastrous than that of a long bridge of the same height. Not only, therefore, on long and important bridges, but on short bridges over small streams and roadways, is it important to have the floor system constructed in the most careful manner, and with the best approved appliances for insuring safety.

In the State of New York by section 2 of chapter 616 of the Acts of last year, it was provided as follows: "After November 1, 1887, guard posts shall be placed in the prolongation of the line of bridge trusses, so that in case of derailment the posts and not the bridge shall receive the blow of the derailed locomotive or car."

The object of these posts seems to be to stop a derailed locomotive or car and prevent it from going on to the bridge at all. If the post should succeed in stopping the car there would certainly be a very bad smash-up. If the derailed car should strike the post on its side, and should pass by it, the presence of the post, instead of doing good, might even twist

the car round so that it would be more likely to strike the trusses. The Board believe that it is safer to attempt to guide a derailed car over a bridge than to attempt to stop it suddenly just before it reaches the bridge. The railroad commissioners of New York recommended that guard rails, as well as guard posts should be required, but the Legislature omitted to require guard rails.

FREIGHT TRAIN BRAKES AND CAR COUPLERS.

Train Brakes.

During the past year great improvements in the train brake have been made, and it can now be used on long trains of freight cars with remarkable effectiveness and entire success. Considerations of economy, as well as of safety, require its adoption. It enables freight to be carried more rapidly and by more frequent trains. It eliminates some dangers and diminishes many. It promotes the safety of passenger trains. It will largely do away with the dangerous necessity of traveling over the tops of freight cars, and thus save the loss of many limbs and lives. When it is no longer necessary for a brakeman to run from one car to another in order to apply the brakes, it will not be necessary to have the bridges over railroads so high above the tracks as at present, and thus it will be easier to prevent the creation of grade crossings, and to secure the abolition of those that exist.

The train brake question, like the automatic coupler question, is complicated by the great number of freight cars belonging to corporations out of the State which pass over our roads. But the train brake is now so far perfected that, in spite of the difficulties in the way of securing uniformity throughout the country, the Board believes that the time has come when the companies in this State should agree upon a standard form of train brake and apply it to their own freight cars. The Fitchburg and Old Colony Railroads have begun to apply the Westinghouse system.

Car Couplers.

By the statistics furnished with this report it appears that one hundred and eleven employees have been injured and

eleven killed during the past year in coupling or uncoupling cars. This is about one-half of all the injuries that have happened to the trainmen. When it is remembered that the record throughout the United States is similar to that in Massachusetts, an army of maimed appears to urge that decisive action shall be taken to do away with this unnecessary risk. As the freight business of the country increases, the number of the maimed will increase each year unless improved appliances are adopted.

By chapter 222 of the Acts of 1884, it was provided as follows : —

SECTION 1. Every railroad company operating a railroad, or any portion of a railroad, wholly or partly within the State, shall place upon every freight car hereafter constructed or purchased by such corporation, and upon every freight car owned by such corporation, of which the coupler or draw bar is repaired by it, with intent to use such car, such form, or forms, of automatic or other safety coupler at each end thereof as the board of railroad commissioners may prescribe after examination and test of the same, and the railroad commissioners may annul any recommendation made by them.

Under the foregoing act this Board has approved of several safety couplers. The first approval was dated Dec. 5, 1884, and comprised the following: the Janney Car Coupler, the Hilliard, the Cowell, the United States and the Ames. Since that time the Hein, the Boston Automatic and the Safford have been approved. Over five thousand approved couplers have been applied by the railroad companies in this State, and thus far nine accidents have occurred in their use, eight of which happened in coupling an approved coupler to a coupler of the old style.

A new condition of affairs now exists. At the last annual meeting of the Master Car Builders' Association the executive committee, to whom the question of automatic couplers had previously been referred, made an elaborate report containing the following recommendation : —

That this Association adopt as a standard form of coupling the Janney type of coupler; that the Association procure one of the present makes of Janney type of coupler, selection being made by a committee appointed for that purpose, and then all other forms of

couplers that will couple to and with this coupler under all conditions of service are to be considered as within the Janney type and conforming to the standard of this Association.

This recommendation, after discussion, was then submitted to the members of the Association for decision by letter ballot, as required when a standard of construction is recommended for adoption. Of the 668 votes cast, 474 were in favor of the recommendation, and more than two-thirds having voted in the affirmative, the recommendation was declared adopted. The general character of the coupler having been determined upon, a sub-committee of the Association is now at work upon what shall be considered the standard proportions and lines of the essential parts. The field will then be open to inventors to devise couplers, which will couple automatically with all others of the standard form. The action of the Association has only a recommendatory character and is not binding upon the members or upon the companies represented.

The coupler finally selected by the Master Car Builders is that which was placed first in the list of those approved by this Board in 1884.

No single State can enforce uniformity in the matter of freight-train brakes and automatic couplers, and it is also obvious that there would be great difficulty and probably much delay in securing congressional action. There is, however, reason to hope that the leading lines of railroad will now take up these two questions without waiting for State or congressional compulsion, and that uniformity throughout the country may practically be attained.

Heretofore the efforts of the Board have been limited to securing the application of some kind of automatic coupler, offering a choice among several. Now, by virtue of the action of the Master Car Builders, a different and far better consummation seems possible. It is too early yet to determine what should be done. It may be that progress toward uniformity may be hastened or encouraged by the holding of a convention of railroad commissioners or of railroad officials. It may be that legislation will be desirable. Failure means that hundreds of men will be injured or killed every year. Success means that they shall be saved. The Board will de-

vote to this cause its best energies, and if occasion demands, make further report hereon to the Legislature at its present session.

HEATING AND LIGHTING PASSENGER CARS.

The following resolve was approved on the 6th of June last : —

The Board of Railroad Commissioners is hereby instructed to investigate the subject of providing better and safer methods of heating and lighting passenger cars used upon the several railroads in the Commonwealth, and to report to the next General Court the result of their investigation, with such recommendations and suggestions as they may desire to make.

Heating.

On the same date as that of the foregoing resolve, chapter 362 of the Acts of last year, being an act relating to the heating of passenger cars on railroads, became a law. Said act is as follows : —

SECTION 1. No passenger, mail or baggage car on any railroad in this Commonwealth shall be heated by any method of heating or by any furnace or heater, unless such method or the use of such furnace or heater shall first have been approved in writing by the Board of Railroad Commissioners : *provided, however*, that in no event shall a common stove be allowed in any such car ; *and provided, also*, that any railroad corporation may, with the permission of said Board, make such experiments in heating their passenger cars as said Board may deem proper.

SECT. 2. Any railroad corporation violating any of the provisions of the preceding section shall forfeit a sum not exceeding five hundred dollars.

SECT. 3. This act shall take effect upon its passage.

In consequence of said resolve and act the Board on the 25th of June issued the following circular : —

BOARD OF RAILROAD COMMISSIONERS,
20 BEACON STREET, BOSTON, June 25, 1887.

To the ——— Railroad Company.

Please send this Board at your earliest convenience a statement as to your outfit on all the lines operated by your company for heating your passenger, mail and baggage cars. If provided with different

kinds of heaters or stoves, state the number of each kind. Please also state any special methods of protection against fire, outside of the heaters, used by you during the past winter. Please also state what changes you have contemplated for the coming winter, and what experiments in heating you propose to make.

The above information is desired in order to enable the Board to take action under chapter 362 of the Acts of the present year. Hearings upon the matters covered by the act will be given at some future date. The Board at the present time desire to collect information as to the outfit of the various railroads in the Commonwealth, and will be glad to have the information as full as possible.

Per order,

WM. A. CRAFTS, *Clerk.*

In response to said circular answers were received from the various roads, and a digest of them is herewith submitted:—

Baker Heater.—Boston & Providence, 5, and 50 on Shore Line; Boston, Revere Beach & Lynn, 3; Boston & Maine, 118; Boston & Albany, 93; New York & New England, 4; Boston & Lowell, 14; Fitchburg, 11; Housatonic, 30 and 2 hung underneath.

Chilson Stove.—Boston & Providence, on all cars but 5; Boston, Revere Beach & Lynn, 17; Milford & Woonsocket, 1; Connecticut River, 4; Providence & Worcester, 37; Boston & Maine, 118; Fitchburg, 49; Worcester & Shrewsbury, all.

Creamer Heater.—New London Northern, 2; Fitchburg, 6.

Eaton Car Stoves (Wood).—Cheshire, all passenger cars but 2; Connecticut River, 15; Boston & Maine, 37.

Emerson Car Heating System.—Connecticut River, 17 local, and to be adopted throughout.

Gold Heater.—Providence, Warren & Bristol, 1 train.

Howard Stove.—Boston & Maine, 63 wood.

Johnson Hot Water Heater.—Providence & Worcester, 14; Old Colony, 158; Boston & Maine, 57; Boston & Albany, 39; Boston & Lowell, 8.

Johnson Steam Heater.—Fitchburg, 6.

Martin Steam Heating.—Providence & Worcester, intention, 3 trains; Boston & Albany, 21 and large additions intended.

Railway King.—Cheshire, postal and baggage cars; Fitchburg, 35.

Salmon Heater.—Boston & Maine, 2.

Special Heater.—Boston, Revere Beach & Lynn, 1.

Standard Steam Heaters.—Fitchburg, 6.

Spear Stove.—Fitchburg, 106; Housatonic, 9.

Spear Hot Air Heater.—Cheshire, 2 passenger; Milford & Woonsocket, 3; Connecticut River, 10; Providence & Worcester, 6; Boston & Maine, — wood; New York & New England, 87; Boston & Lowell, 41; Fitchburg, 60.

Stove.—Connecticut River, 1; New London Northern, all but 2, wood; Old Colony, 74 coal, 71 wood; Boston & Albany, 1 wood, 106 coal; New

York & New England, 95; Boston & Lowell, 100 wood and 2 coal; Boston & Maine, 78.

Standard Steam Heater.—Providence & Worcester, 2.

Sewall Steam Heating.—Old Colony, intention, 1 train; New York & New England, 3 and intend to test further; Fitchburg, 4.

Steam and Hot Water Heating from Locomotive.—New York & New England, 3 and intend to test further.

Searle Heater.—Boston & Albany, 22; Fitchburg, 1.

Thayer Heater.—Old Colony, 2.

Westinghouse Heater.—Providence & Worcester, 1; Boston & Lowell, 1.

Wilder (F. M.) Steam Heating from Locomotive.—Old Colony, intention, 1 train.

Having received the statements from the various roads the Board took into careful consideration its duty under the statute. It fully appreciated the great responsibility which had been cast upon it by the action of the Legislature in prohibiting the use of any method of heating or any furnace or heater without first obtaining the approval in writing of the Board. It realized that the Legislature had placed upon it the onerous and delicate duty of so controlling the heating of cars that danger from fire should, if possible, be obviated. As set forth in the report of last year, the Board was satisfied “that the system of heating by steam from the locomotive is feasible, safe and unattended by any serious difficulty, so far as important through trains are concerned, and also in regard to cars which are constantly performing a short service, and trains run continuously on a belt line.” Reflection, however, convinced the Board that it was not open for it at that time to limit its approval solely to the systems of heating by steam from the locomotive. It was the middle of summer before the answers were received. If the companies had known just what system they wished to adopt and just how to apply it, and had begun at once, it would have been impossible for all of them to get their work done in season for the winter. The work, so far as done, would have been done hurriedly, and without sufficient care, and much of it would necessarily prove unsatisfactory. The number of different systems of heating by steam from the locomotive was so large that it would take considerable time to make a wise selection. Only two of the railroads knew anything about the systems from actual experience of their own. The other roads would be obliged to investigate the subject from the beginning, and that too at a time when

they could not see any system in operation, and could examine only the specifications, drawings and models. Such examinations are apt to prove delusive.

It was plain, therefore, that unless the Board intended that a large proportion of the cars should go unheated during the winter and that many others should be but imperfectly heated, it would not be proper to issue an order limiting approval simply to systems of heating by steam from the locomotive.

The next question which arose was as to what action should be taken in reference to heaters and stoves within the cars, and an examination of the statute was made to discover what the powers of the Board were in the premises. It appeared from the statute that furnaces and heaters approved by the Board could be used, but that in no event would a common stove be allowed. The word "heater" seems to include both furnaces and stoves. Either a furnace (hot air, hot water or steam) or a stove may be called a heater. The statute, therefore, authorizes the use, if approved in writing by the Board, of furnaces and of such heaters as are not common stoves.

It is evident that the Legislature did not intend, as has been claimed, to entirely forbid the use of separate heaters or stoves in the cars. Had it so intended, it would have prohibited the use of any furnace or heater placed within the car, or suspended from it. Moreover, because it is necessary to give effect to every word in a statute, it follows that the absolute prohibition extends not to all stoves, but only to that class of stoves called common stoves.

This explanation is necessary because the impression seems to prevail that the law of last year is violated in every case where a car is heated by a stove. Prior to 1882 there was great laxity in the use of car stoves in this State, but by a statute passed that year it was required that such safeguards for protection against fire should be used as were approved in writing by this Board. In accordance with that act many stoves which might then have been called common stoves, being without safety appliances, were discarded and additional safeguards were required upon others. In view of these facts the most liberal constructionists now claim that, if a stove is

furnished with the safety appliances approved by the Board under the act of 1882, it cannot be a common stove.

The Board believed that there was an opportunity for a great advance in the immediate future in the matter of heating cars. It also realized that the law might be rendered obnoxious and the desired consummation deferred by extreme measures or too great haste. Nothing would be so bad as to compel the railroads to adopt immediately some one of the numerous systems of train heating and then find that it did not work satisfactorily. Not only would the companies then call for a repeal of the law, but public opinion might sustain them. Inasmuch as only two railroads in Massachusetts had made the experiment of heating by steam from the locomotive, and as there was a large number of different systems, some of which, appearing to have great merit, had never been practically tried, it was deemed advisable to take such action as would result in a thorough trial during the present winter by different companies of different systems. One thing more was evident, that if the Board withdrew its approval from a large number of stoves, and the companies were thereby obliged to discard them and fit their cars up at considerable expense with separate heaters of a higher and better class, those companies would be less willing in the immediate future to discard these new appliances and substitute steam heat from the locomotive therefor. The foregoing considerations led to the issue of the following circular: —

COMMONWEALTH OF MASSACHUSETTS.

BOARD OF RAILROAD COMMISSIONERS,

20 BEACON STREET, BOSTON, Aug. 24, 1887.

To the ——— Railroad Company.

Chapter 362 of the Acts of the present year is as follows: —

SECTION 1. No passenger, mail or baggage car on any railroad in this Commonwealth shall be heated by any method of heating or by any furnace or heater unless such method or the use of such furnace or heater shall first have been approved in writing by the Board of Railroad Commissioners: *provided, however*, that in no event shall a common stove be allowed in any such car; *and provided also*, that any railroad corporation may with the permission of said Board, make such experiments in heating their passenger cars as said Board may deem proper.

SECT. 2. Any railroad corporation violating any of the provisions of the preceding section shall forfeit a sum not exceeding five hundred dollars.

SECT. 3. This act shall take effect upon its passage.

This act became a law on the 6th day of June last, and on the 25th day of June this Board issued a circular to the railroads asking for a statement as to their respective outfits for heating cars. These statements were furnished as promptly as could have been expected, and yet more than a month elapsed before full returns from the roads were received.

In the summer time it is impossible to make satisfactory practical tests of heating apparatus, and yet it is necessary for the Board, without delay, to approve in writing of some methods of heating, of some furnaces or heaters, so that the corporations may not be obliged to choose between heating the cars illegally and suffering them to go unheated.

An examination made last winter of the practical working of the Emerson, Martin and Sewall systems satisfied the Board that the use of steam from the locomotive promises better results in the four great elements of safety, comfort, simplicity and economy than any other device now known, and the Board hereby approves of the method of heating cars by steam from the locomotive at low pressure, and recommends that each railroad should at once prepare to make practical tests of the system during the coming winter.

While, however, the results already obtained by the various inventors using this system are remarkably satisfactory, and while the Board believes that this system will eventually largely supersede the use of separate heaters, it nevertheless realizes that further improvements are probable, and that difficulties, especially with reference to local trains, are still unsolved. It is worthy of note in this connection that the president of the Connecticut River Railroad, in response to the above-mentioned circular of this Board, dated June 25th, states that:—

Seventeen of our cars are heated by the Emerson car heating system, and are used only on our local trains. . . . This system we have found to be very simple in its construction and management, and less expensive than heating cars by stoves.

The importance of securing uniformity of steam-pipe couplings and of providing in many cases for the heating of a car when not attached to a locomotive are obvious.

The separate heater cannot at present be wholly dispensed with, nor would it be possible for the railroads to make so radical a change before cold weather sets in. The cars must be heated. The chill of the unheated car would probably kill more people than the flames from broken heaters. Death would ensue not so suddenly, but none the less surely.

Chapter 54 of the Acts of the year 1882 reads as follows:—

Every drawing-room or sleeping car, passenger, baggage, mail and express car, owned or regularly used on any railroad in this Commonwealth, in which heating apparatus may be placed, shall be provided with such safeguards for protection against fire as may be approved in writing by the Board of Railroad Commissioners. Any corporation violating the provisions of this section shall forfeit for each offence three hundred dollars. The provisions of this section shall take effect the first day of November, one thousand eight hundred and eighty-two.

Since the passage of the foregoing act the use of heating apparatus not provided with safeguards approved by the Board in writing has been illegal. From time to time during the past five years applications for such approval have been made, and in some cases they have been granted and in others refused. The Board does not withdraw the approvals heretofore granted under the Act of 1882 aforesaid, and hereby, for the present, renews such approvals, provided, however, that in no event shall a common stove be allowed in any passenger, mail or baggage car, the use of such stoves being expressly prohibited by the aforesaid act of the present year.

In selecting heating apparatus to take the place of the "common stove," the Board recommends the adoption of the system of heating by steam from the locomotive, or at least of such approved heating apparatus as can be used in connection with or readily converted into such system.

For the Board,

GEORGE G. CROCKER, *Chairman*.

Subsequently the following circular was issued: —

COMMONWEALTH OF MASSACHUSETTS.
BOARD OF RAILROAD COMMISSIONERS.

To the ——— Railroad Company.

By chapter 71 of the Resolves of the present year the Board of Railroad Commissioners was instructed to investigate the subject of providing better and safer methods of heating and lighting passenger cars, and to report to the next General Court the result of their investigation, with such recommendations and suggestions as they may desire to make.

The Board, in accordance with circular issued on the 25th of June, has received a statement as to the outfits at the beginning of the summer of the respective railroads for heating cars; and it now desires a statement, to be returned not later than the 5th of December, giving information upon the following points: —

First. Present outfit, showing what changes have been made since the previous return.

Second. A statement as to the practical working of any system or systems of heating by steam from the locomotive in use

on your road, covering among other things the question of the relative economy and efficiency of these systems as compared with the old system of individual heaters or stoves.

Third. The form of steam pipe coupler used, and a statement as to its working, including suggestions as to the best method of securing uniformity of steam coupler, or such arrangement as will render it possible for cars of different roads to be brought into the same train and heated by steam from the locomotive.

Fourth. What further improvements in outfit for heating you intend to make during the coming winter. What during the coming summer.

Fifth. A description of such system or systems as you may have for lighting cars, stating the kinds of lamps and oil used, the method of lighting by electricity, if in use on your road, with an estimate of the relative cost of oil and electricity, if both are in use.

Sixth. A statement of such accidents, if any, as have happened on your road, within the past five years, from the methods of lighting in use. For the Board,

GEORGE G. CROCKER, *Chairman.*

NOVEMBER 28, 1887.

The interesting and instructive responses to this circular will be found in the Appendix. From them it appears that the following systems of train heating are in use in Massachusetts : —

Emerson System.—Connecticut River Railroad, 24 cars, and it is the intention of the corporation to apply it this winter to all of its cars on through passenger trains.

Gold System.—Boston & Providence Railroad, 20 cars.

Henney System.—New York, New Haven & Hartford Railroad, 1 train.

Martin System.—Boston & Albany Railroad, 101 cars, and it is the intention of the company to equip the rest of its passenger and baggage cars with the same system as fast as possible, so that the whole equipment will probably be completed during this winter; Providence & Worcester Railroad Company, 17 cars.

Safety Heating and Lighting Company of New York, otherwise called the Wilder System.—New York & New England Railroad, 13 cars and 11 more in process; Old Colony Railroad Company, 4 cars; New York, New Haven & Hartford Railroad, 1 train.

Sewall System.—Boston & Providence Railroad, 18 cars; Fitchburg Railroad Company, 11 cars; Old Colony Railroad Company, 8 cars; New York & New England Railroad Company, 3 cars; Providence & Worcester Railroad Company, 3 cars; Boston & Maine Railroad, to be tested on through trains to Bangor; Massachusetts Central Railroad, to be applied to 1 train.

The Boston, Revere Beach & Lynn Railroad has devised a special system of its own and has applied it to all of its cars, thus being the first railroad in the Commonwealth, and probably in the world, to abolish separate heaters in all cars and heat entirely by steam from the locomotive.

The Boston & Providence has also devised a special system of its own and has applied it to seventeen cars.

It will be seen from the foregoing that eight different systems are now on trial in Massachusetts. The progress made is greater than that in any other State, and indicates wise liberality and decided enterprise on the part of the management of many of our roads.

The Boston & Albany has won the distinction of having distanced all the other standard gauge roads in the race to the goal of safety in heating. The management of the company has just cause to be proud of its record in this respect, and it deserves marked commendation therefor.

In answer to an inquiry addressed to the Railway Department of the Board of Trade, London, the following communication was received:—

BOARD OF TRADE (RAILWAY DEPARTMENT).

LONDON, S. W., Oct. 26, 1887.

The Secretary of the Board of Railroad Commissions, 20 Beacon Street, Boston, Mass.

SIR:—I am directed by the Board of Trade to acknowledge the receipt of your letter of the 12th inst., asking for information with reference to the methods adopted in England and on the continent of Europe for warming passenger cars.

In reply, I am to inform you that ordinary passenger carriages on railways in this country are not heated, but passengers are, under certain circumstances and for certain lengths of journey, supplied with metal vessels containing hot water and acting as foot-warmers, on application to the guard of the train. Where Pullman cars are used they are heated by stoves as in America. These arrangements are made by the companies, and are not subject to any State control.

I am to add that the Board of Trade do not possess this information with reference to continental railways.

I am, sir, your obedient servant,

COURTENAY BOYLE.

Chapter 616 of the Acts of last year, in the State of New York is, as follows:—

[Chap. 616.]

AN ACT TO REGULATE THE HEATING OF STEAM PASSENGER CARS AND TO PROVIDE FOR THE PLACING OF GUARDS AND GUARD POSTS ON RAILROAD BRIDGES AND TRESTLES AND THE APPROACHES THERETO.

SECTION 1. It shall not be lawful for any steam railroad doing business in this state, after the first day of May, eighteen hundred and eighty-eight, to heat its passenger cars, on other than mixed trains, by any stove or furnace kept inside the car or suspended therefrom, except it may be lawful, in case of accident or other emergency, to temporarily use such stove or furnace with necessary fuel: *provided*, that in cars which have been equipped with apparatus to heat by steam, hot water or hot air from the locomotive, or from a special car, the present stove may be retained, to be used only when the car is standing still; *and provided, also*, that this act shall not apply to railroads less than fifty miles in length nor to the use of stoves, of a pattern and kind to be approved by the railroad commissioners for cooking purposes in dining-room cars.

SECT. 2. After November first, eighteen hundred and eighty-seven, guard posts shall be placed in the prolongation of the line of bridge trusses so that in case of derailment the posts and not the bridge trusses shall receive the blow of the derailed locomotive or car.

SECT. 3. Any person or corporation violating any of the provisions of this act shall be liable to a penalty of one thousand dollars, and to the further penalty of one hundred dollars for each and every day during which such a violation shall continue.

SECT. 4. Upon the application of any railroad covered by the provisions of this act, the board of railroad commissioners may approve of any proposed safeguard or device to be used under the provisions of this act, and thereafter the railroad using such safeguard or device so approved shall not be liable to any of the penalties prescribed by this act for a violation thereof in regard to any such safeguard or device.

SECT. 5. The violation of any of the provisions of this act will be deemed a misdemeanor.

SECT. 6. This act shall take effect immediately.

Under the foregoing law but little progress has as yet been made. It is understood that the New York Central Railroad intends to adopt the Martin system.

There is considerable variety in the methods of train heating. In some the live steam of the locomotive is used, in others exhaust steam, in one live and exhaust steam are used

alternately, and some have a separate car, built largely of iron, with apparatus for furnishing steam heat, and electricity for light. In some the live steam is driven through the train under pressure, in others exhaust steam is pumped through. In some the air in the cars is heated by direct radiation from the pipes through which the steam passes, in others fresh air is so heated and supplied, and in others still, the car is heated by a circulation of hot water which in its turn is heated by the steam from the locomotive. There are no satisfactory data at present available for a comparison between the amount of steam required per car by the different systems, nor indeed, have statistics covering a sufficient range of tests been as yet furnished with reference to any single system.

In the details of the systems there is still greater variety than in their principles. Especially in the matter of couplers there are a great many devices. The use of a uniform steam coupler is essential to the success of train heating, and it will perhaps be found in this matter even more difficult to attain uniformity than in the matter of couplers for freight cars. It is questionable whether uniformity can be promoted by legislation. In any event it is too early now to make any recommendation in relation thereto.

Having stated what this Board has done, and having shown the condition of the heating question in Massachusetts at the present time, the Board deems that it would be injudicious for it to draw any conclusions or make any recommendations of legislation on the subject until the experiments being tried this winter in this and other States have shown more clearly the capabilities and the limitations of the system. The Board will probably desire in the month of March to make further report upon this subject.

Lighting.

Public Statutes, chap. 112, sect. 172, is as follows: “No passenger car on a railroad shall be lighted by naphtha nor by any illuminating oil or fluid made in part of naphtha, or which will ignite at a temperature at less than 300 degrees Fahrenheit. For a violation of any provision of this section the corporation shall forfeit a sum not exceeding five hundred dollars.”

In answer to the inquiry embraced in the circular aforesaid addressed to the various railroad companies, it was reported in every case that they knew of no accident during the past five years resulting from the method of lighting in use.

The Boston & Albany Railroad experimented last year with electricity furnished by a Julien storage battery suspended under the cars and the system is now in use on that road on two trains running between Boston and New York. The light is much superior to oil, being sufficient to read by with comfort in all parts of the car, and the heat generated is less. The president of the corporation writes as follows:—

Without taking into consideration the cost of maintaining storage batteries, electricity costs about ten times as much per burner as oil. How much additional is to be charged to the batteries we are not able at present to tell, for their life is not yet determined, but we have information sufficient to warrant us in saying that in the present state of the art this method of lighting cannot come into general use.

Success in the matter of lighting by electricity seems to be close at hand, but has not as yet been attained to such a degree as to warrant compulsory legislation.

SUNDAY TRAINS.

By section 15 of chapter 98 of the Public Statutes this Board could authorize the running of through trains on Sunday, but the running of all local trains and of steamboat lines on Sunday was, by the provisions of that chapter, illegal. Section 3 of chapter 391 of the Acts of 1887 amended the provision of the Public Statutes, and vested in the Board the power to authorize the running of such steamboat lines and of such trains, whether local or through, on Sunday, as the Board having regard to the due observance of the day deems to be required by public necessity and convenience.

The statute of last year was therefore a direct enlargement of the powers of the commission, and showed that the Legislature deemed it proper in certain cases that local trains and steamboat lines should be run on Sunday with the sanction of law. Under the act, several petitions have been received, and carefully limited permits have been granted.

FREIGHT AND PASSENGER RATES.

No important question as to rates has been brought before the Board during the year. The nearest approach thereto was a complaint made by holders of mileage tickets of the Boston & Maine Railroad, that some of the distances given on the mileage table of the Eastern Division of that road materially exceeded the actual distances. The complaint proved to be well founded, and the Board recommended that the mileage table be corrected to conform to the facts. (See Appendix.)

INTERSTATE COMMERCE ACT.

At the beginning of the year a law of the United States, entitled "An Act to regulate commerce," and commonly called the Interstate Commerce Act, was passed and a commission appointed thereunder. This act embodies some regulations as to rates, which have no counterparts in our statutes, while those which have counterparts differ from our State laws in their terms. Moreover, the decisions already rendered show that the interpretation given to the United States statute differs from the interpretation given by this Board in past years to the corresponding provisions of our State statutes.

It is especially worthy of note that the interpretation of the long and short haul clause, in the case of the Louisville & Nashville Railroad Company, shows that the United States law upon that subject is more elastic than our State law. The differences in phraseology are numerous, and the differences in the scope and the application of the respective statutes intricate. Experience may prove that it will be wise to make our State laws, so far as they attempt to regulate rates, conform to the provisions of the United States law.

THE NANTASKET BEACH RAILROAD.

The Nantasket Beach Railroad has not been operated since the fall of 1886. Upon petition, and after a hearing in July last, the Board held that it was the duty of the present owners of the property to operate the road (see Appendix), but that duty has not since been fulfilled. The subject of a lease of this road to the Old Colony Railroad Company is pending, and legislation may be needed in order to secure the operation of the road during the coming season.

THE DEDHAM BRANCH OF THE NEW YORK & NEW ENGLAND
RAILROAD.

The Board has also held that it is the duty of the New York & New England Railroad to put in order and operate its Dedham Branch, so called, from Islington to Dedham, the operation of which several years ago was discontinued. (See Appendix.)

HOOSAC TUNNEL & WILMINGTON RAILROAD.

By letter dated Jan. 5, 1887, the president and directors of the Hoosac Tunnel & Wilmington Railroad Company were notified that the Board had examined that road as far as ice and snow permitted, and that it could not certify that the laws relating to the construction of railroads had been complied with or that the road appeared to be in a safe condition for operation.

By letter dated June 20, 1887, addressed to the president and directors, they were notified that the Board would, if desired, make another examination of the road on the following Monday, to see whether a certificate opening it for public use could properly be issued, and the attention of the officers of the road was called to the fact that if they were operating the road without such certificate they were so doing in violation of law.

By letter dated July 2, addressed to John C. Newton, treasurer of the Hoosac Tunnel & Wilmington Railroad, he was notified that at a meeting of the Board held that day his application for a certificate under Public Statutes, chap. 112, sect. 141, opening the road for public use, was considered and it was voted not to issue such a certificate.

By letter dated Aug. 6, 1887, addressed to John C. Newton, Esq., treasurer Hoosac Tunnel & Wilmington Railroad Company, he was again advised that he had no right to carry passengers on his road in Massachusetts until a certificate of approval should be obtained.

When the returns from this company were received it was found that they showed receipts from passengers and freight for the year amounting to \$9,209.05. The Board thereupon, in accordance with Public Statutes, chap. 112, sect. 15, on November 15 last, presented to the attorney-general the facts relating to this violation of law.

No penalty for such a violation is imposed by the statutes. The remedy is by injunction. The company continued operating the road in wilful violation of law, even after being notified that the case had been placed in the hands of the attorney-general, until Saturday, Dec. 24, 1887, when learning that the attorney-general was prepared to apply at once for an injunction, the company reported that it had closed its road to the public. On the same day, upon the request of the company, the Board gave another hearing as to the issue of a certificate and it was found that the laws relating to the construction of railroads had not all been complied with, and hence that a certificate could not be issued.

AN INDEX TO THE REPORTS.

The Chairman of the Board during the past summer prepared for his own use a brief consolidated index to the reports of the commission. It was not intended for publication, but on the request of various persons who have frequent occasion to consult the reports, and in the hope that it may make the valuable material contained in the reports more readily accessible to the Legislature, to railroad officials, and to the public, the index is submitted as one of the documents in the Appendix.

In closing this report the Board records the death of its late Chairman, Hon. Thomas Russell, on February 8 last. His scholarly attainments, accurate knowledge of law and judicial temperament, his untiring zeal in and devotion to the duties of his office, and his never-failing urbanity, won for him not only the respect and admiration of his associate Commissioners, but the well-deserved praise and confidence both of the public and of the officials and employees of the railroad and railway corporations.

GEORGE G. CROCKER.

E. W. KINSLEY.

E. A. STEVENS.

APPENDIX.

[A.]
Receipts of Flour in Boston during Ten Years ending Sept. 30.

FLOUR — BARRELS.										
	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.
Boston & Albany Railroad,	784,149	536,767	462,852	629,355	569,692	699,553	610,073	667,148	520,810	456,161
Boston & Lowell Railroad,	121,416	191,265	236,443	160,704	104,376	133,491	132,825	186,304	119,324	126,891
Fitchburg Railroad,	248,566	478,852	549,354	869,971	777,466	1,268,605	1,514,586	1,172,335	1,747,500	1,662,582
Grand Junction (B. & A. R.R.),	447,518	600,184	936,783	911,357	668,133	1,110,564	1,107,960	1,193,323	894,118	1,076,691
N. Y. & New England R.R.,	—	89,327	89,542	190,169	227,576	331,391	278,944	101,214	69,011	66,167
Total by through lines } from West,	1,601,649	1,896,395	2,274,974	2,761,556	2,347,243	3,543,604	3,642,788	3,320,324	3,350,763	3,388,492
Boston & Maine Railroad,	32,092	42,631	28,361	29,227	13,343	16,126	9,383	1,462	1,431	2,761
Boston & Providence R.R.,	3,084	1,387	4,421	4,241	3,588	5,548	1,876	349	1,091	1,088
Eastern Railroad,	—	2,985	6,064	11,335	4,732	9,950	11,776	1,580	—	—
Old Colony Railroad,	2,685	2,162	3,392	3,646	5,115	4,390	3,218	1,941	3,414	2,199
Portland Steamer,	220	182	150	1,893	352	459	187	25	905	298
New York Steamer,	111,083	120,382	80,125	18,642	2,121	991	6,130	1,857	3,963	6,859
Baltimore Steamer,	20,047	9,364	15,941	16,162	4,907	7,562	21,648	12,574	13,196	19,413
Philadelphia Steamer,	5,053	1,045	1,022	300	1,625	10	1,370	250	274	823
New Orleans Steamer,	—	—	697	—	—	225	—	—	—	—
Sail-Vessels,	} 1,310	300	400	—	—	1,823	4,937	2,741	135	—
Other Sources,										
Total from Seaboard,	175,574	180,438	140,573	85,646	35,783	47,084	62,725	22,779	24,409	33,441
Total from all Sources,	1,777,223	2,076,833	2,418,859	2,853,079	2,383,026	3,590,688	3,705,513	3,343,103	3,375,172	3,421,933

Increase in 1887, 45,761 barrels = 1 + per cent.

Receipts of Corn in Boston during Ten Years, ending Sept. 30.

CORN — BUSHELS.										
	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.
Boston & Albany Railroad, .	1,219,245	1,006,160	659,467	1,349,388	807,175	927,490	1,041,605	1,603,457	1,380,395	1,385,793
Boston & Lowell Railroad, .	534,849	617,026	3,836,219	794,534	1,355,529	571,595	510,214	408,400	226,370	429,553
Fitchburg Railroad, .	2,003,559	3,472,195	2,897,389	3,659,457	2,640,372	4,111,500	3,876,725	3,764,185	4,399,160	2,427,420
Grand Junction (B. & A. R. R.),	5,799,140	5,855,850	7,328,338	8,560,384	3,170,842	3,386,291	4,193,700	2,987,880	2,185,400	2,518,400
N. Y. & New England R. R., .	—	23,695	29,060	177,519	329,114	843,554	363,637	38,051	76,551	48,886
Total by through lines } from West, . }	9,556,793	11,014,926	14,750,473	14,541,282	8,303,032	9,840,430	9,985,881	8,801,973	8,267,876	6,810,052
Boston & Maine Railroad, .	70,599	144,295	202,752	257,841	255,295	305,077	124,635	6,150	60,386	45,665
Boston & Providence R. R., .	—	120	—	—	—	700	800	500	1,170	1,175
Eastern Railroad, .	—	11,300	5,700	2,500	7,050	16,270	6,664	1,425	—	—
Old Colony Railroad, .	—	—	—	—	7,650	5,300	5,450	500	1,100	1,250
Portland Steamer, .	—	—	—	—	—	—	—	—	—	—
New York Steamer, .	6,500	—	—	—	5,000	—	—	—	—	728
Baltimore Steamer, .	1,492	6,400	76	—	10,811	15,712	32,942	6,498	4,816	6,687
Philadelphia Steamer, .	8,682	—	—	—	—	—	—	—	240	—
New Orleans Steamer, .	—	—	—	—	—	16,444	—	1,500	—	—
Sail-Vessels, .	} 16,186	6,000	—	200	8,000	*72,891	5,416	—	—	19,500
Other Sources, .										
Total from Seaboard, .	103,459	168,115	208,528	260,541	293,806	432,394	175,907	16,573	67,712	75,005
Total from all Sources, .	9,660,252	11,183,041	14,959,001	14,801,823	8,596,838	10,272,824	10,161,788	8,818,546	8,335,588	6,885,057

Decrease in 1887, 1,450,531 bushels, = 17 per cent.

* Savannah Steamer.

Receipts of Oats in Boston during Ten Years, ending Sept. 30.

OATS — BUSHELS.

	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.
Boston & Albany Railroad,	656,349	728,634	604,310	1,094,476	1,411,900	1,332,825	1,754,628	2,170,405	2,179,530	1,663,457
Boston & Lowell Railroad,	202,823	256,548	181,636	201,602	469,327	163,421	78,876	487,889	474,539	610,256
Fitchburg Railroad,	1,807,810	1,828,720	1,994,597	1,751,469	1,615,072	2,734,844	3,124,318	2,877,370	4,695,640	3,572,504
Grand Junction (B. & A. R.R.),	377,400	592,235	720,454	663,000	472,450	558,200	702,250	463,700	194,670	217,000
N. Y. & New England R.R.,	—	22,600	32,341	46,650	163,000	93,118	85,260	33,722	19,615	98,105
Total by through lines from West,	3,044,372	3,428,787	3,533,338	3,757,197	4,131,749	4,882,408	5,745,332	6,033,086	7,563,994	6,161,322
Boston & Maine Railroad,	53,433	23,350	46,442	21,050	103,875	28,400	5,925	7,575	4,182	1,000
Boston & Providence R.R.,	—	—	—	—	—	—	—	—	—	—
Eastern Railroad,	—	5,700	12,950	8,100	138,835	20,005	7,100	400	—	—
Old Colony Railroad,	—	—	—	—	2,750	800	3,100	600	2,325	650
Portland Steamer,	—	—	—	—	—	—	—	—	—	—
New York Steamer,	—	—	—	—	—	—	1,437	—	—	—
Baltimore Steamer,	—	—	—	—	—	—	—	—	—	—
Philadelphia Steamer,	—	—	—	—	—	—	—	—	—	—
New Orleans Steamer,	—	—	—	—	—	—	—	—	—	—
Sail-Vessels,	—	—	—	—	—	—	—	—	—	—
Other Sources,	—	—	—	—	—	—	—	2,968	—	—
Total from Seaboard,	53,433	29,050	59,392	29,150	245,460	49,205	17,562	11,543	6,507	1,650
Total from all Sources,	3,097,805	3,457,787	3,592,730	3,786,347	4,372,209	4,931,613	5,762,894	6,044,629	7,570,501	6,162,972

Decrease in 1887, 1,407,529 bushels, = 18 per cent.

Receipts of Wheat in Boston during Ten Years, ending Sept. 30.

WHEAT—BUSHELS.

	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.
Boston & Albany Railroad, .	130,618	174,310	65,691	50,525	28,700	36,005	24,900	91,855	40,919	49,596
Boston & Lowell Railroad, .	298,654	916,431	981,761	337,253	250,641	198,731	94,666	106,968	199,574	6 9,617
Fitchburg Railroad, .	233,416	1,306,085	724,743	994,446	918,763	990,289	842,662	1,193,555	730,443	1,713,755
Grand Junction (B. & A. R. R.),	3,441,910	2,753,450	2,436,921	2,832,769	1,458,400	1,037,170	722,100	871,300	1,127,371	1,613,100
N. Y. & New England R. R., .	—	7,568	34,232	955	175,400	295,100	103,074	—	121	1,700
Total by through lines } from West, . . . }	4,104,598	5,157,844	4,243,348	4,215,948	2,831,904	2,557,295	1,787,402	2,263,678	2,098,428	3,447,768
Boston & Maine Railroad, .	400	27,448	53,522	23,932	37,884	17,957	10,400	—	1,088	600
Boston & Providence R. R., .	770	1,001	102	—	—	10,000	600	—	—	—
Eastern Railroad, .	—	—	—	—	800	1,015	1,400	600	—	—
Old Colony Railroad, .	—	—	—	—	500	—	—	—	—	—
Portland Steamer, .	—	—	—	—	—	—	—	—	—	—
New York Steamer, .	2,452	—	—	—	—	—	—	—	—	—
Baltimore Steamer, .	—	—	—	—	—	—	—	—	—	—
Philadelphia Steamer, .	—	—	—	—	—	—	—	—	—	—
New Orleans Steamer, .	—	—	—	—	—	—	—	—	—	—
Sail-Vessels,	—	—	—	—	—	—	—	—	—	—
Other Sources,	35,017	—	—	—	—	—	4,500	—	—	—
Total from Seaboard, .	38,639	28,449	53,624	23,932	39,184	28,972	16,900	600	1,038	600
Total from all Sources, .	4,143,237	5,186,293	4,296,972	4,239,880	2,871,088	2,586,267	1,804,302	2,264,278	2,099,516	3,448,368

Increase in 1887, 1,358,852 bushels, = 64 per cent.

Percentage of Total Receipts for each Road.

	Flour.	Corn.	Oats.	Wheat.
Boston & Albany,	44.8	56.7	30.5	48.2
Boston & Lowell,	3.7	6.2	9.9	2.1
Fitchburg,	48.6	35.2	52.99	49.7
New York & New England,	1.9	0.7	1.6	—
All other sources,	1	1.2	0.01	—
	100	100	100	100

Summary of Grain Receipts in Boston during Ten Years.

	Flour — Barrels.	Corn — Bushels.	Oats — Bushels.	Wheat — Bushels.
1878,	1,777,223	9,660,252	3,097,805	4,143,237
1879,	2,076,833	11,183,041	3,457,787	5,186,293
1880,	2,418,859	14,959,001	3,592,730	4,296,972
1881,	2,853,079	14,801,823	3,786,347	4,239,880
1882,	2,383,026	8,596,838	4,377,209	2,871,088
1883,	3,590,688	10,272,824	4,931,613	2,586,267
1884,	3,705,513	10,161,788	5,762,894	1,804,302
1885,	3,343,103	8,818,546	6,044,629	2,264,278
1886,	3,375,172	8,335,588	7,570,501	2,099,516
1887,	3,421,933	6,885,057	6,162,972	3,448,368

[B.]

Tabular Statement of Accidents reported to the Board of Railroad Commissioners during Year ending Sept. 30, 1887.

RAILROADS.	GENERAL STATEMENT.							PASSENGERS.			
	Whole Number of Persons Injured.	Passengers.	Employees.	At Grade Crossings and Stations.	Trespassers.	Children.	Adults.	By Causes beyond their own Control.		By their own Misconduct or want of Caution.	Injured.
								Killed.	Injured.		
Boston & Albany,	164	24	96	10	34	6	158	1	16	-	7
Boston & Lowell,	65	5	41	8	11	1	64	-	-	2	3
Boston & Maine,	113	16	33	14	50	13	100	-	-	6	10
Boston & Providence,	150	126	5	3	16	3	147	22	102*	-	2
Fitchburg,	123	15	82	5	21	2	121	-	3	1	11
New York & New England,	67	1	50	1	15	2	65	-	-	-	1
Old Colony,	53	7	17	8	21	5	48	-	-	3	4
Boston, Winthrop & Shore,	2	-	2	-	-	-	2	-	-	-	-
Cheshire,	8	3	1	-	4	1	7	-	-	2	1
Connecticut River,	-	-	-	-	-	-	-	-	-	-	-
Hanover Branch,	2	-	1	-	1	-	2	-	-	-	-
Milford & Woonsocket,	-	-	-	-	-	-	-	-	-	-	-
Nantasket Beach,	4	-	3	-	1	-	4	-	-	-	-
New Haven & Northampton,	2	-	1	-	1	-	2	-	-	-	-
New London Northern,	5	-	3	-	1	1	2	-	-	-	-
New York, New Haven & Hartford,	-	-	-	-	2	1	4	-	-	-	-

Tabular Statement of Accidents, etc. — Continued.

RAILROADS.	EMPLOYEES.													
	Train-Men.	Other Employees.	By Coupling or Uncoupling Cars.		By Overhead Bridges.		By Train Acci- dents.		Falling f'm Train or Engine.		Various Causes.*		Total Killed.	Total Injured.
			Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.				
Boston & Albany,	81	15	3	23	—	2	2	15	7	15	7	22	19	77
Boston & Lowell,	29	12	—	15	1	1	—	—	2	5	8	9	11	30
Boston & Maine,	27	6	1	17	1	1	—	—	2	4	1	6	5	29
Boston & Providence,	5	—	—	—	—	—	1	3	—	—	1	—	2	3
Fitchburg,	72	10	4	30	—	1	2	8	3	6	8	20	17	65
New York & New England,	44	6	—	15	2	1	—	—	2	11	3	16	7	43
Old Colony,	15	2	1	2	—	—	—	—	5	3	2	4	8	9
Boston, Winthrop & Shore, Cheshire,	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Connecticut River,	1	—	—	—	—	—	—	—	1	—	—	—	1	—
Hanover Branch,	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Milford & Woonsocket,	1	—	—	1	—	—	—	—	—	—	—	—	—	—
Nantasket Beach,	—	—	—	—	—	—	—	—	—	—	—	—	—	—
New Haven & Northampton,	2	1	—	2	—	—	—	—	—	—	—	1	—	3
New London Northern,	—	1	—	—	—	—	—	—	—	—	—	1	—	1
New York, New Haven & Hartford, Norwich & Worcester,	2	1	—	1	—	—	—	—	—	—	1	1	1	2
Providence & Worcester,	3	—	—	2	—	—	—	—	—	1	—	—	—	3
Troy & Greenfield,	1	—	—	—	—	—	—	—	—	—	—	—	—	1
Worcester, Nashua & Rochester,	8	3	—	3	—	—	—	—	—	1	2	3	3	8

Housatonic, of Connecticut, . . .	6	—	2	—	—	—	—	—	—	—	2	1	1	3	3
Boston, Revere Beach & Lynn, . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Grafton Centre, . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Martha's Vineyard, . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nantucket, . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worcester & Shrewsbury, . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Union Freight, . . .	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—
Manchester & Lawrence, . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	300	57	11	111	4	6†	6	26	24	50	34	85	79	278	

* Crossing track or carelessly stepping in front of moving engine or car, 26; jumping from moving train, 16; stumbling in getting upon car, 6; struck by passing train, 10; caught between platform and car, 5; contact with signal post, 4; contact with switch lever or target, 3; slipping on ladder, 4; stumbling against train, attempting to board moving train, caught between two engines, falling on track, and run over while inspecting under cars, 2 each; caught between switch-handle and car, thrown from hand-car, foot caught in frog, falling from bridge, falling from passenger car, etc., 1 each.

† Including three injured by contact with bridge-guard, water-spout and semaphore.

Tabular Statement of Accidents, etc. — Concluded.

RAILROADS.	AT GRADE CROSSINGS.				AT STATIONS.		TRESPASSERS.				
	With Gates or Flag-men.	Without Gates or Flagmen.	Killed.	Injured.	Killed.	Injured.	Unlawfully on Track.	Unlawfully on Cars.	Killed.	Injured.	Apparent Suicide.
Boston & Albany,	—	10	5	5	—	—	26	8	17	17	2
Boston & Lowell,	5	2	2	5	—	—	9	2	8	3	—
Boston & Maine,	5	5	4	6	2	2	41	9	29	21	2
Boston & Providence,	1	2	2	1	—	1	12	4	13	3	3
Fitchburg,	3	1	1	3	—	1	20	1	12	9	—
New York & New England,	—	1	—	1	—	—	13	2	9	6	1
Old Colony,	3	5	4	4	—	—	16	5	17	4	2
Boston, Windthrop & Shore,	—	—	—	—	—	—	—	—	—	—	—
Cheshire,	—	—	—	—	—	—	—	—	—	—	—
Connecticut River,	—	—	—	—	—	—	4	—	4	—	—
Hanover Branch,	—	—	—	—	—	—	—	—	—	—	—
Milford & Woonsocket,	—	—	—	—	—	—	1	—	1	—	—
Nantasket Beach,	—	—	—	—	—	—	—	—	—	—	—
New Haven & Northampton,	—	—	—	—	—	—	—	1	—	—	—
New London Northern,	—	—	—	—	—	—	1	—	1	1	1
New York, New Haven & Hartford,	—	—	—	—	—	—	1	1	1	1	—
Norwich & Worcester,	—	—	—	—	—	—	1	—	1	—	—
Providence & Worcester,	—	2	—	2	—	—	1	1	1	1	—
Troy & Greenfield,	—	—	—	—	—	—	7	—	7	—	—
Worcester, Nashua & Rochester,	—	—	—	—	—	—	—	1	1	—	—

[illegible]

Train Accidents reported to the Board of Railroad Commissioners during the Year ending September 30, 1887.

COLLISIONS.	Number.	Persons killed.	Persons injured.
<i>Rear.</i>			
Passenger train with freight train on siding, caused by misplaced switch,	1	—	4
Passenger train with freight train backing to siding, by failure of flagman to go far enough,	1	—	—
Passenger train with cars standing on main track, flag not sent back far enough,	3	—	4
Freight train with another freight train, by failure of flagman to go back far enough,	2	1	—
Freight train with its detached engine, which it followed too close to allow switch to be thrown,	1	—	4
<i>Crossing.</i>			
Engine from side track with passenger train on main track,	1	—	—
Engine from one track with freight train on another track in yard,	1	—	4
	10	1	16
DERAILMENTS. *			
Passenger trains, caused by broken journal,	2	1	15
Passenger trains, caused by broken rail,	1	—	3
Passenger trains, caused by defect in switch,	1	—	2
Freight train, caused by land slide,	1	1	—
Freight train, cause unknown,	1	1	—
Mixed train, caused by misplaced switch,	1	—	—
Passenger train, by falling of bridge,	1	24	100
	8	27	120

* Derailments causing no personal injury, slight damage to property and no serious delay of passenger trains, are not reported.

Tabular Statement of Accident; reported to the Board of Railroad Commissioners during Ten Years.

	GENERAL STATEMENT.								PASSENGERS.				EMPLOYEES.		
	Whole number of Casualties to Persons.	Passengers.	Employees.	At Highway Crossings and Stations.	Trespassers.	Children.	Adults.	Fatal.	Not Fatal.	From Causes beyond their own Control.	From their Misconduct or Want of Care.	Fatal.	Not Fatal.	Train-Men.	Other Employees.
Year ending Sept. 30, 1878,	304	38	96	37	133	37	267	150	154	2	36	10	28	68	28
“ “ 1879,	405	208	83	32	82	25	380	115	290	186	23	21	188	71	12
“ “ 1880,	346	24	157	54	111	24	322	146	200	1	23	9	15	113	44
“ “ 1881,	415	42	200	47	126	23	392	184	231	11	31	15	27	167	33
“ “ 1882,	414	27	198	57	132	29	385	163	251	4	22	9	15	158	40
“ “ 1883,	524	61	266	50	147	33	491	191	333	1	24	14	21	192	73
“ “ 1884,	457	76	182	38	161	33	424	181	276	44	32	14	62	139	43
“ “ 1885,	517	74	233	55	152	28	486	163	351	12	62	14	60	191	42
“ “ 1886,	583	107	273	44	159	43	540	201	382	45	62	20	87	212	61
“ “ 1887,	802	198	357	54	193	38	764	265	537	144	54	37	161	300	57
Total,	4,767	855	2,045	468	1,396	343	4,451	1,759	3,005	450	369	163	664	1,591	433
Average,	476.7	85.5	204.5	46.8	139.6	34.3	445.1	175.9	300.5	45.0	36.9	16.3	66.4	159.1	43.3

Tabular Statement of Accidents, etc., during Ten Years — Concluded.

	EMPLOYEES — Concluded.							AT HIGHWAY CROSSINGS.				AT STATIONS.		TRESPASSERS.				
	Coupling or un-	By Overhead	By Train Ac-	Falling from	Various	Fatal.	Not Fatal.	With Gates or	Without Gates	Fatal.	Not Fatal.	Fatal.	Not Fatal.	Walking or ly-	Unlawfully	Fatal.	Not Fatal.	Suicide.
	Coupling Cars.	Bridge.	idents.	Train.	Causes.			Flagmen.	or Flagmen					ing on track.	riding on Cars.			
Year ending Sept. 30, 1878,	24	10	15	15	32	34	62	12	17	20	9	3	5	102	31	84	49	3
" " 1879,	25	7	8	24	19	28	55	13	17	13	17	1	1	70	12	54	28	5
" " 1880,	43	12	21	47	34	49	108	20	30	19	31	1	3	93	18	72	40	4
" " 1881,	59	28	18	46	48	72	128	12	24	11	25	5	6	104	22	81	45	3
" " 1882,	60	18	15	43	62	56	142	25	29	21	33	3	—	109	23	75	57	7
" " 1883,	86	14	13	55	97	62	203	18	26	15	29	4	2	112	33	93	54	3
" " 1884,	68	12	11	35	56	47	135	19	13	13	19	4	2	126	35	104	57	4
" " 1885,	91	10	19	42	70	29	204	20	30	23	27	1	3	120	32	93	59	3
" " 1886,	107	8	25	55	78	62	211	15	20	22	13	6	3	130	29	91	68	3
" " 1887,	122	10	32	74	119	79	278	17	30	19	28	3	4	158	35	126	67	11
Total, . . .	685	129	177	426	615	518	1,526	171	236	176	231	31	29	1,124	270	892	524	46
Average, . . .	68.5	12.9	17.7	42.6	61.5	51.8	152.6	17.1	23.6	17.6	23.1	3.1	2.9	112.4	27.0	89.2	52.4	4.6

Tabular Statement of Accidents to Employees in Massachusetts during Ten Years.

YEAR ENDING SEPT. 30.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	Total.
Injured by coupling cars, . . .	24	25	43	49	60	86	68	91	107	122	675
by overhead bridges, . . .	10	7	12	28	18	14	12	12	8	10	131
by train accidents, . . .	15	8	19	18	15	13	11	19	25	32	175
by falling from trains, . . .	15	24	47	46	43	55	35	42	55	74	436
by other causes, . . .	30	17	34	47	62	97	56	69	78	119	509
by explosion of locomotives, . . .	2	2	2	2	—	—	—	—	—	—	8
Totals, . . .	96	83	157	200	198	265	182	233	273	357	1,934

*Train Accidents in the United States in each Month during the Year ending Sept. 30, 1887.**

	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	Total.
Collisions,	63	63	65	54	57	45	28	35	43	61	65	83	662
Derailments,	51	59	46	73	67	59	58	43	42	53	64	63	678
Other train accidents,	4	8	4	13	8	13	4	5	3	3	8	4	77
Total train accidents,	118	130	115	140	132	117	90	83	88	117	137	150	1,417
Derailment of passenger trains 1885-86,	18	16	16	35	26	16	20	12	17	18	20	22	236
Derailment of freight trains,	33	43	30	38	41	39	38	33	25	35	44	41	440
Number of persons killed,	32	8	9	15	46	42	24	18	5	19	102	18	338
Number of persons injured,	60	62	59	89	72	171	64	35	38	71	236	93	1,050
Collision between passenger trains,	1	2	8	30	21	24	3	16	15	34	27	41	222
Collision between passenger and freight trains,	10	15	19	72	83	68	49	43	67	81	96	119	758
Collision between freight trains,	52	46	38	24	7	9	17	8	11	44	26	40	246
Number of persons killed,	16	23	21	42	34	39	42	30	58	191	86	95	760
Number of persons injured,	43	32	68	42	34	39	42	30	58	191	86	95	760
Other train accidents,	4	8	4	13	8	13	4	5	3	3	8	4	77
Number of persons killed,	—	2	5	7	2	8	—	5	1	3	1	3	37
Number of persons injured,	3	12	2	6	—	2	2	8	4	9	1	3	52

Total number of persons killed,	. . . . .	621	Average collisions per month,	. . . . .	55.17
Total number of persons injured,	. . . . .	1,862	Average derailments per month,	. . . . .	56.5

* As reported in the Railroad Gazette.

Train Accidents in the United States during Ten Years.

	1877-78.	1878-79.	1879-80.	1880-81.	1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.
Total number of train accidents, .	779	843	937	1,480	1,332	1,640	1,293	1,230	1,141	1,417
Total number of persons killed, .	200	182	227	435	385	475	388	331	366	621
Total number of persons injured, .	689	751	946	1,691	1,467	1,798	1,913	1,534	1,497	1,862

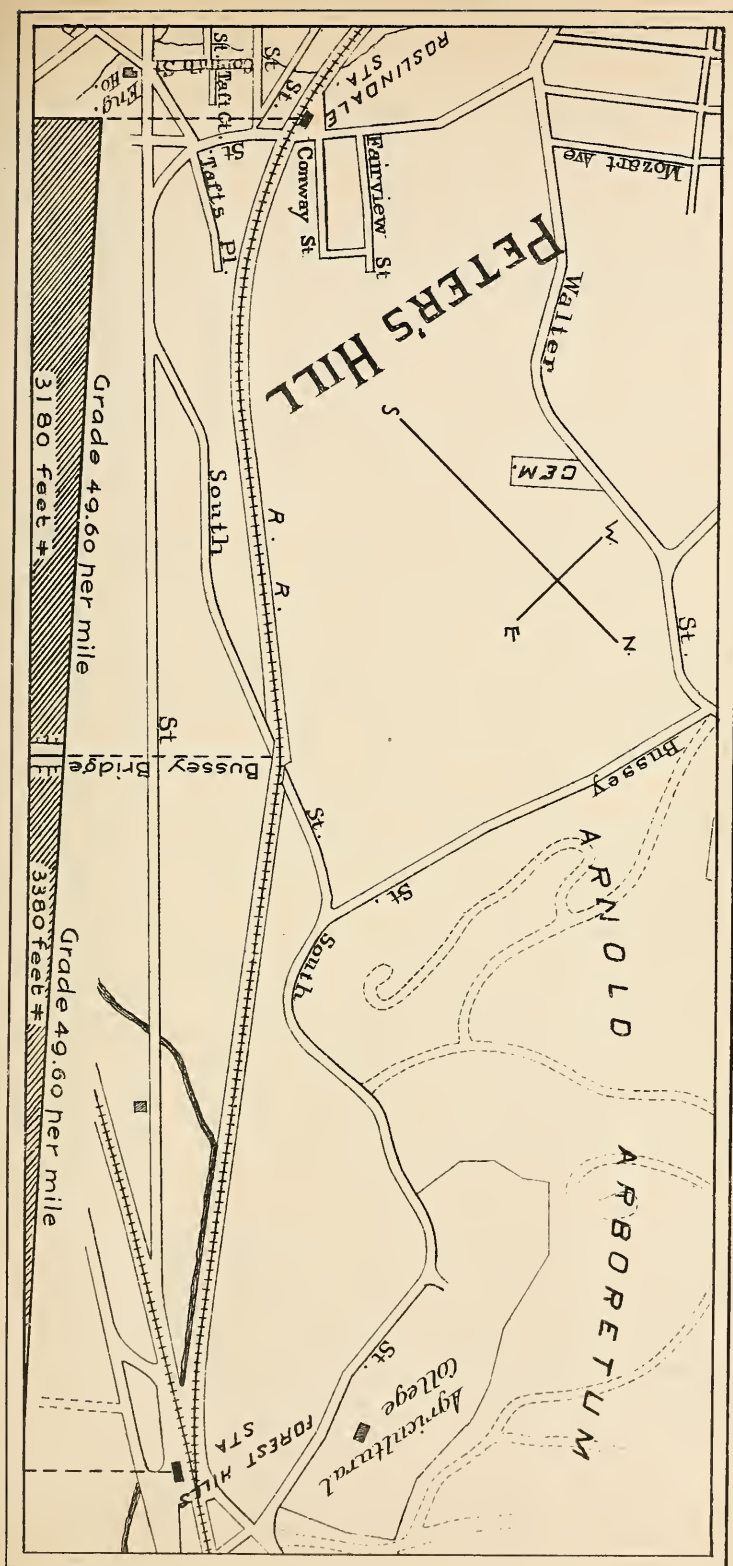
[C.]

SPECIAL REPORTS ON ACCIDENTS.

DISASTER ON THE DEDHAM BRANCH OF THE BOSTON & PROVIDENCE RAILROAD, AT THE BRIDGE COMMONLY KNOWN AS THE BUSSEY BRIDGE, MONDAY, MARCH 14, 1887.

On the morning of the fourteenth day of March last past, an appalling disaster happened to the seven o'clock train from Dedham on the Dedham branch of the Boston & Providence Railroad at the bridge commonly known as the Bussey Bridge over South Street, between the Roslindale and Forest Hills stations, in that part of Boston called West Roxbury.

Within a few hours after the catastrophe, two members of the Board visited the scene, carefully examined the wreck, and in accordance with their request, Mr. A. A. Folsom, the superintendent of the road, undertook to have preserved all portions of the wreck which would be likely to throw light on the cause of the accident, and especially two broken hangers to which his attention was called. On the same afternoon the Board employed Mr. Thomas Doane, civil engineer, as an expert in its behalf, to make a careful examination of the details of the wreck, and to see that all important portions of it were preserved in accordance with the agreement of the superintendent. The railroad company also employed Mr. Edward S. Philbrick to act in a similar capacity in its behalf.



MAP OF RAILROAD & VICINITY BETWEEN ROSLINDALE & FOREST HILLS

THE HEARINGS.

The first public hearing was given on Tuesday, the fifteenth day of March, being the day after the accident, and thirteen sessions in all were held, the last being on Monday, the 4th of April.

The Board felt that greater confidence would be placed in the testimony of the employees of the train if they were examined without delay, and accordingly proceeded at once with their examination. Next they examined the officials of the road who were responsible for the road-bed, for the bridge and for the rolling-stock; then those people who were represented to have discovered defects in the bridge in the past; then two eye-witnesses of the disaster and several passengers on the train, and finally the experts. This order of the investigation gave the experts the benefit of all the evidence which was before the Commission, so that they could express their opinion with a full knowledge of the details of the disaster.

The employees of the train who were examined were conductor William H. Alden, engineer Walter E. White, fireman Alfred E. Billings, and brakemen John Tripp and Elisha Annis. There were two other conductors, one of whom, Myron Tilden, was killed, probably at the rear platform of the third car, as his body was found on the embankment on the Boston side of the bridge behind the car; and the other, Webster N. Drake, was so badly injured as to be unable to attend. There was a third brakeman, Winfield W. Smith, who also suffered severe injuries.

This is a complete list of the employees in charge of the train.

The Board also examined the president of the company, Mr. Henry A. Whitney, and two of the directors, Messrs. Balch and Robeson; the superintendent of the road, Mr. A. A. Folsom; the master mechanic, Mr. George Richards; the superintendent of construction, Mr. George F. Folsom (not a relation of Mr. A. A. Folsom, the super-

intendent of the road); the chief car inspector, Mr. Edward Lang; the foreman of carpenters, Mr. James A. Folsom, a brother of Mr. George F. Folsom; the clerk in the superintendent's office, Mr. George A. Davis; and the builder of the bridge, Mr. Edmund H. Hewins.

Messrs. Harlan W. Brock, Henry C. Allen, Theodore B. Moses and Israel G. Whitney were examined in relation to reported defects in the bridge; Thomas P. Lally of the Boston Fire Department, as to fires; and Martin Lynch and Joseph McDonald, as eye-witnesses of the accident.

The following passengers also testified:—

Messrs. W. K. Dennett, Frank Davidson and Arthur W. Crosby, who were in the first car; Messrs. Joseph K. P. Reed, Rudolph Weimar, Julius Meyer and Wright W. Williams, who were in the second car; Messrs. Charles T. Bowthorp, Charles E. Farrington and Winslow J. Spaulding, who were in the third car; Messrs. Charles C. Darling, Jr., and Frank Cutter, who were in the fourth car; Messrs. Cyrus W. Hayes, Francis W. Gibbons and George F. Waldron, who were in the fifth car; Mr. Edward V. Cormerais, Miss Alice L. Page and Miss Mary A. Page, who were in the sixth car; and Mr. Louis Arnold, who was in the eighth car.

Among the experts who were examined were Henry Manley, Assistant Engineer of the city of Boston; Prof. George F. Swain, of the Institute of Technology; Prof. George L. Vose, and Messrs. Edward S. Philbrick and Thomas Doane, civil engineers.

THE MAKE-UP OF THE TRAIN AND THE NUMBER OF PASSENGERS.

It appeared that the train left Dedham at seven o'clock in the morning, drawn by the engine "Torrey," built in 1880 at the Rhode Island Locomotive Works, and weighing $32\frac{1}{2}$ gross tons. There were nine cars on the train, arranged in the following order: passenger cars Nos. 52, 18, 28, 87, 54, 80, 81 and 82, and at the rear

end of the train a combination smoking and baggage car No. 1. There were from 275 to 300 people on the train when it left Roslindale. The fourth car, No. 87, was fortunately not so well filled as some of the others.

THE KILLED AND WOUNDED.

The dead number twenty-three. Most of them were killed outright. Some survived a few hours, one several days. Over one hundred were injured, and of these more than half received injuries of a serious nature. Many of the victims, being residents of Roslindale, were cared for by their friends and relatives. Some were brought to the city, where arrangements were made by the railroad for their reception at the hospitals; but as soon as ambulances and other means of conveyance could be obtained most of the sufferers were taken to their homes.

THE HISTORY OF THE BRIDGE.

The Bussey Bridge was formerly a Howe truss wooden bridge. At that time portions of it were tinned to prevent it from catching fire, and it then acquired the name of the "Tin Bridge." In 1870, the westerly wooden truss was replaced by an iron rectangular truss made by the National Bridge Company, of which Mr. C. H. Parker was engineer. The bridge was then a nondescript bridge, having one iron and one wooden truss. In 1876, the railroad company removed the wooden truss, changed the Parker truss from the west side to the east side of the bridge, and had a new iron truss put on the west side. This work was done by Edmund H. Hewins, civil engineer. Only two proposals were made at that time to the company for rebuilding or repairing this bridge; one from Mr. Parker, representing the National Bridge Company, and the other from Mr. Hewins, representing the Metropolitan Bridge Company. A copy of the proposal made by Mr. Hewins was submitted at the hearing, and was signed "Metropolitan Bridge Company by

Edmund H. Hewins, agent." It appeared that there never had been any such company as the Metropolitan Bridge Company, Mr. Hewins testifying that it was his intention at that time to organize a bridge company, and that he commenced under that name by himself, until such time as the organization could be made, and it was in fact never consummated.

It further appeared that Mr. A. A. Folsom, the superintendent of the road, and the superintendent of construction, Mr. George F. Folsom, knew that the bridge was being built partly at the Trenton Iron and Steel Company's Works and partly at the Phoenix Bridge Company's Works, but that they never inquired about the standing or even the existence of the Metropolitan Bridge Company, and knew only and looked only to Mr. Hewins for responsibility in the matter. They had known him previously as engineer for the Moseley Iron Works at Readville, and his bearing impressed them as that of an able and upright man. Mr. A. A. Folsom, the superintendent of the road, also testified that he made inquiry of one man, now dead, in regard to Mr. Hewins, and received a favorable report, and thinks he may have inquired of one or two others.

The main tension members of the bridge were made at the Phoenix Iron Works, and were of excellent workmanship and apparently of good material. The rest of the bridge was made at the Trenton Iron and Steel Company's Works, also a reputable company; but it appeared that the work there was done, not under the superintendence of the officers of that company, but under the superintendence of an agent of Mr. Hewins, the iron company furnishing only the iron, the workmen and the tools, so that the company did not and does not consider itself responsible for the quality of the iron or the workmanship. Moreover, Mr. George F. Folsom, the superintendent of construction, testified that since 1861 he had had charge of the construction and repairs of buildings and of bridges, that for ten



HELIOTYPE PRINTING CO.,

THE BUSSEY BRIDGE.

BOSTON, MASS.

years previous to that date he had worked as a machinist in the shops of the company, that up to the time of his appointment as superintendent he had had no practical experience in bridge building, that his first experience in iron bridge building was in connection with these trusses in the Bussey Bridge, that he was at the bridge but little while the construction was going on, that he had other business to attend to, and that he trusted wholly to Mr. Hewins to build the bridge properly and put it up in proper shape.

The work of putting up the bridge was done under the superintendence of Mr. Hewins by employees of the Boston & Providence Railroad.

It further appears that the railroad company employed no expert to pass either upon the original design of the bridge or upon the bridge after it was constructed, and in fact consulted nobody in regard to it.

If the management of the railroad had taken the trouble to make inquiry, it would have learned that the company which Mr. Hewins professed to represent did not in fact exist, and that not only the design but the quality of much of the materials and workmanship of the bridge depended solely upon his ability, honesty and faithfulness.

As a matter of fact, the material and workmanship of the compression members appear to have been sufficiently good. The design in many of its details proved to be bad.

Such a way of doing business would be lax in a purely commercial transaction. In contracting for and constructing a bridge, in dealing with a matter involving the safety of life, it was culpable.

DESCRIPTION OF SOME OF THE PECULIARITIES OF THE BRIDGE.

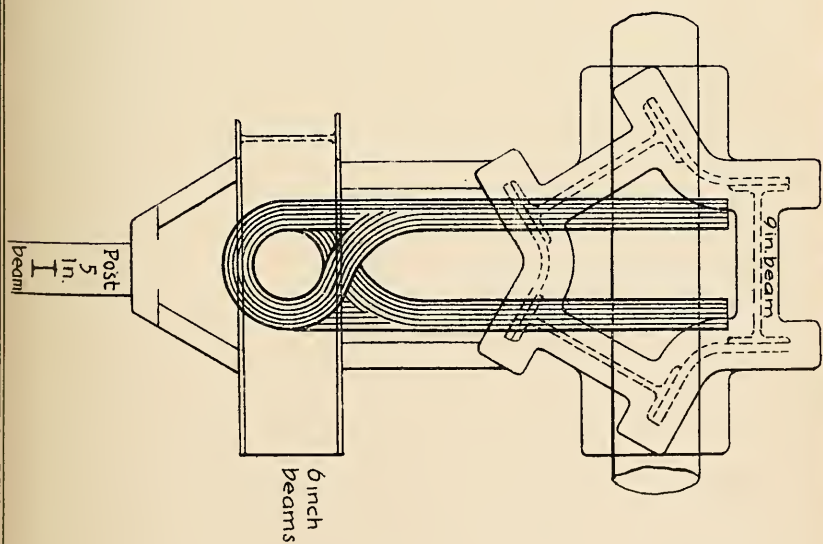
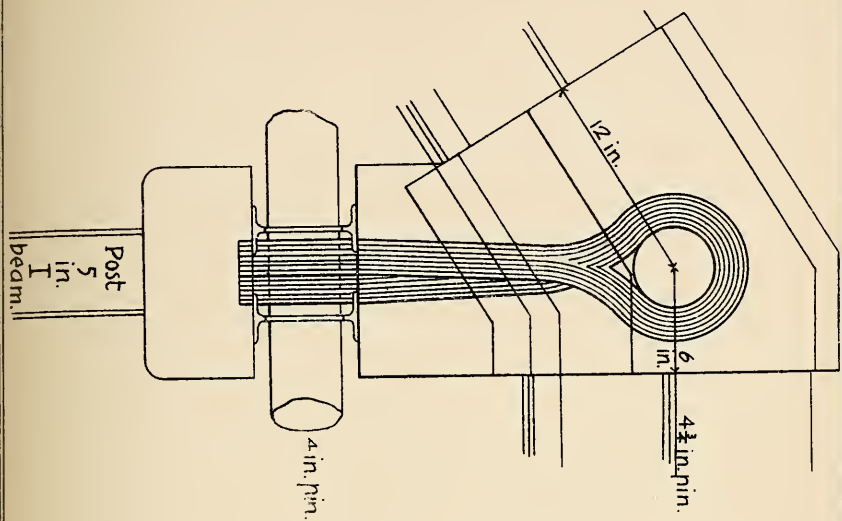
The old rectangular or Parker truss, as has been stated, was removed in 1876 from the west to the east side, and the new Hewins truss, which had oblique end-posts, was erected on the west side. The cross iron floor-beams

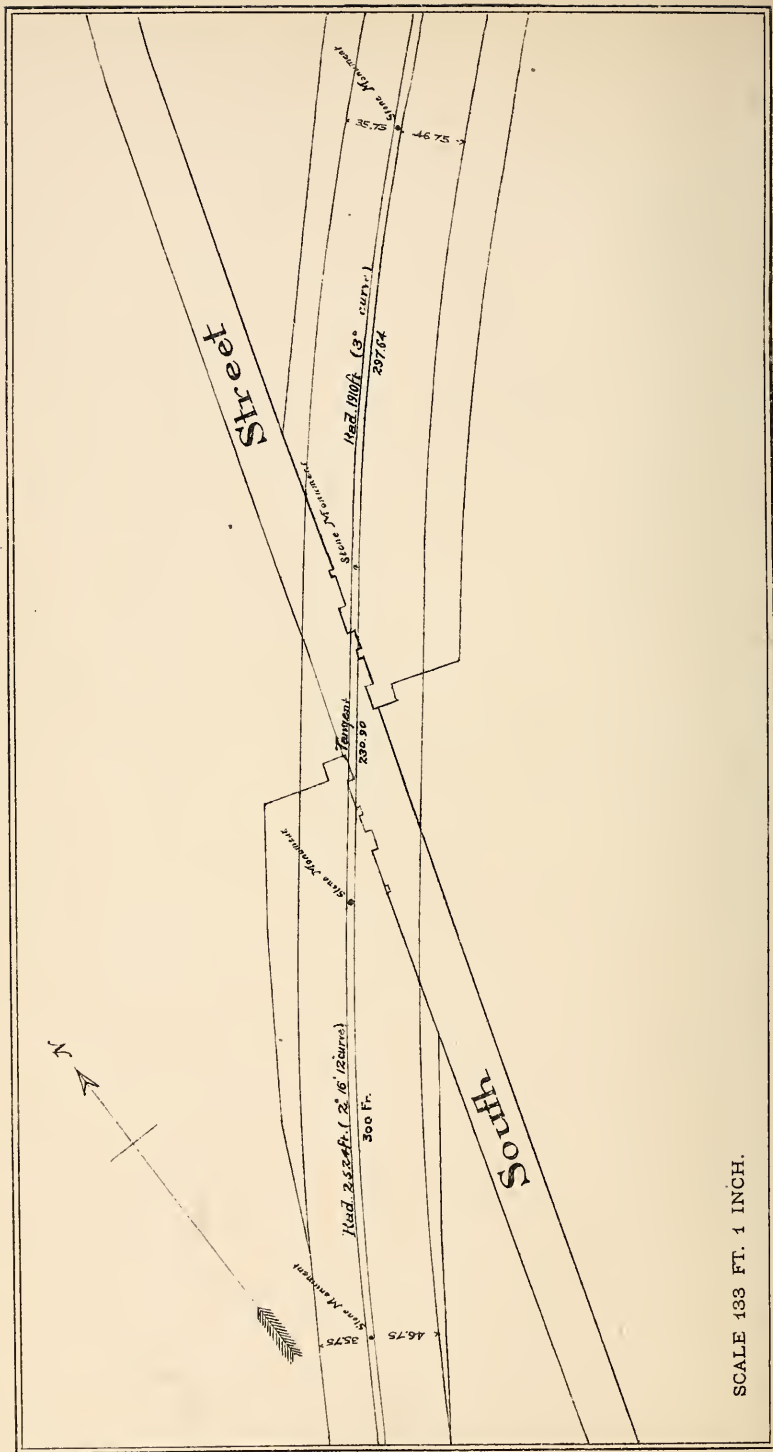
rested on top of the Parker truss, but were hung underneath the top chord of the Hewins truss. The skew of the bridge was so great that the floor-beam which ran from the centre of the Hewins truss rested on the north end of the Parker truss.

In the top chord of the Hewins truss were three cast-iron joint-blocks, one at the centre, and one at either end, against which the end posts and the two wrought iron sections of the top chord abutted and were held in position by the force of compression. From the joint-block at either end of the top chord, a cross iron floor-beam was suspended by means of two hangers, the loop at one end of each of which passed round a pin in the joint-block, and at the other end round a pin passing through the two I-beams constituting the cross floor-beam aforesaid. These hangers were so encased in the joint-block and were so placed with reference to the I-beams that only a small portion of the lower side of the lower loop could be seen. Their dimensions are given in the drawings submitted herewith, which also show their eccentricity, so called, — that is, the hangers were so made that a line drawn from the centre of one loop to the centre of the other loop did not coincide with the middle line of the shank, as it should do in order to secure the greatest strength. The cross floor-beams supported by these hangers had also some additional support from a five-inch iron I-post running down to the bottom chord.

The Parker truss was designed to carry its load at seventeen points, but the floor-beams rested upon it at four points only.

The trusses were twenty feet apart from centre to centre, it having been the original idea to put at some time two tracks across the bridge, but in reality only one track had ever been constructed, and that track was placed close to the west or Hewins truss, so that this truss bore about four-fifths of the weight of a passing train, and the Parker or rectangular truss bore the remaining fifth only.





THE TRACK FROM ROSLINDALE TO THE BRIDGE, AND
THE RATE OF SPEED AT WHICH THE TRAIN WAS
MOVING.

The train was from five to seven minutes late when it left the Roslindale station. The distance from this station to the bridge is about three-fifths of a mile.

A curve of two degrees terminates fifty-five feet from the bridge. The track from that point across the bridge and for forty-five feet beyond is straight.

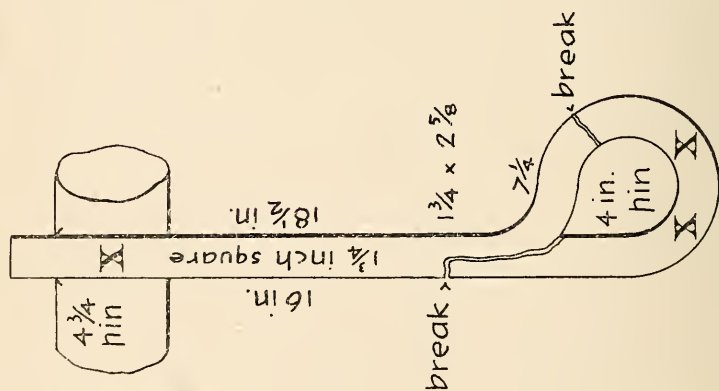
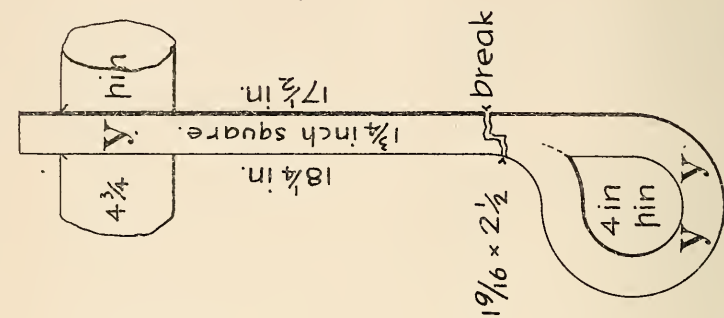
It is a down grade all the way from Roslindale to the Forest Hills station, the grade being fifty feet to the mile. Professor Swain estimated that with the given grade and curvature, allowing for ordinary friction, a train impelled simply by gravity from a position at rest at Roslindale would have acquired a speed of about twenty miles an hour when it reached the bridge. Walter E. White, the engineer, testified that he had about ninety pounds of steam and worked steam with the throttle open two or three notches all the time after leaving Roslindale, but that he had not, in his opinion, acquired a speed of about more than fifteen miles an hour, because the air brakes came off slowly and retarded the train. The condition of the wreck indicated that the train must have been going considerably faster than the engineer supposed. The experts generally placed the rate at thirty miles an hour or more.

The engineer had served in that capacity on the Dedham branch for more than thirty years. He knew that the rules limited the speed on the old bridge to twelve miles an hour, and thought that the same rule applied to the new bridge. He did not know whether he had received any printed or written instructions since the bridge was rebuilt in 1876. If he had received any, he did not know where they were. The superintendent of the road subsequently testified that the limitation as to speed had been removed after the bridge was rebuilt in 1876 and he submitted a printed copy of the present "Rules and Regula-

tions," the second and last edition of which was issued in 1881. It often happens that an employee of long standing blindly follows routine and loses sight of the reason or authority which established the practice. This may be a source of danger and should be guarded against. The engineer showed that he was a man who would tell what he believed to be the truth, no matter how disastrous the consequences might be to himself.

THE ENGINEER'S ACCOUNT OF THE DISASTER.

The engineer testified that when he struck the bridge everything seemed to be all right; that he did not notice any settling or swinging, but when he came to the Boston end of the bridge he saw the forward end of the engine come up with a jar, and when the drivers came along there was a shock; that he looked round and saw the forward car was off the track, and that he had broken away from it, that the coupling was broken, and that the car was off the track and going to the east side. His first impulse was to stop. He reversed the engine and then looked back again, and saw the first and second cars off the track, and a cloud of smoke coming up; then he knew the cars had gone through the bridge. The engine had almost stopped. Then, to use his own words, "I happened to think that we two, me and the fireman, could not do much ourselves, and I knew there was help on the train at Forest Hills, who were going down to Dedham to work on the bridge. I thought of all these things quicker than I can tell it here. So, quick as I could, I put on steam, and went down to Forest Hills. I blew the whistle all the way, with my body hanging out of the window and I saw people coming out of doors, and I kept pointing up the track, and they ran out of their houses, and before I got down to Forest Hills I saw a good many going up that way; and before I got to the station I saw Mr. Worley, and hollered to him that the train had gone through the bridge, and to throw the switch to have



LONGITUDINAL & TRANSVERSE VIEWS OF BROKEN HANGERS

Prince's train run up; and I ran down to Prince's train that was coming on the outward track, and hollered to him what was the matter, and he started and went up there as quick as he could. Then I went back, and hollered to the station agent and told him to telephone for doctors and ambulances. Then after Prince had gone up with his train, I followed up with my engine."

It was due to this wise action of the engineer that notice of the catastrophe was immediately received at the office of the superintendent of the road. The police and fire departments were summoned, and physicians and surgeons were secured and promptly taken to the wreck.

THE CAUSE OF THE DISASTER.

The testimony of the passengers, of the employees on the train and of two outside witnesses shows conclusively that the trouble originated on the north half of the bridge, and the evidence as a whole clearly indicates that the original cause of the disaster was the breaking of the hangers at the joint-block at the north end of the Hewins truss. In this view the counsel of the corporation and the experts, including the expert employed by the corporation, concur. These hangers were found in the street, and were examined by several people, including one of the Commissioners, on the morning of the accident. They were broken, the upper loops with part of the shank remaining in the joint-block and the lower loops with the remainder of the shank lying near by.

One hanger was broken through the shank, and about seven-eighths of this break was old. In the other hanger the lower loop was broken on the side and at its junction with the shank. At the shank there were indications of an old break through about one-eighth of the sectional area. The hangers should have been die forged. They were loop welded, and the weldings were imperfect.

The eccentricity, so called, of these hangers was unnecessary. This eccentricity caused the strains to be

transverse and unequally distributed. In consequence thereof the hangers were for their work in the bridge not nearly as strong as the same amount of material would have been had they been properly designed. Portions of them without making any allowance for the jar of the train were subjected by each passing engine to strains approaching, if not in excess of, the elastic limit. The margin of strength, if any, was so small as to be inconsistent with safety. Iron will surely break if repeatedly subjected to a load which strains it materially beyond its elastic limit. The hangers were unfit for their work. The wonder is that they held on so long as they did. They had been breaking for some time. On the morning of the accident there was little more than the equivalent of one hanger left.

The theory that the disaster was due to a derailment of the train received no sufficient confirmation. On the contrary the fact was abundantly established by the evidence that neither the ties on the embankment south of the bridge nor those on the south half of the bridge itself showed any signs of derailment. If a derailment occurred it must have occurred within a few feet of the joint-block at the north end of the Hewins truss.

A theory was also started at the investigation that the disaster might have been caused by the dropping of a brake beam between the ties, but the theory was not supported by the necessary evidence. If a brake beam dropped at all it must have dropped within a few feet of the hangers.

When the hangers gave way, the track system, from the centre of the bridge to the iron post near the abutment, a distance of fifty-two feet, lost its main support, but it still had considerable strength, not sufficient to carry a train, but sufficient to retard somewhat its fall. In the first place there was the five-inch iron I-post supporting the cross floor-beam, immediately underneath the hangers. Then the track system had in itself some supporting power. There were three sections of sixty-foot rails on



HELIOTYPE PRINTING CO.

BOSTON, MASS.

THE 7TH, 8TH AND 9TH CARS IN THE STREET.



HELIOTYPE PRINTING CO.*

THE 4TH, 5TH AND 6TH CARS IN THE STREET.

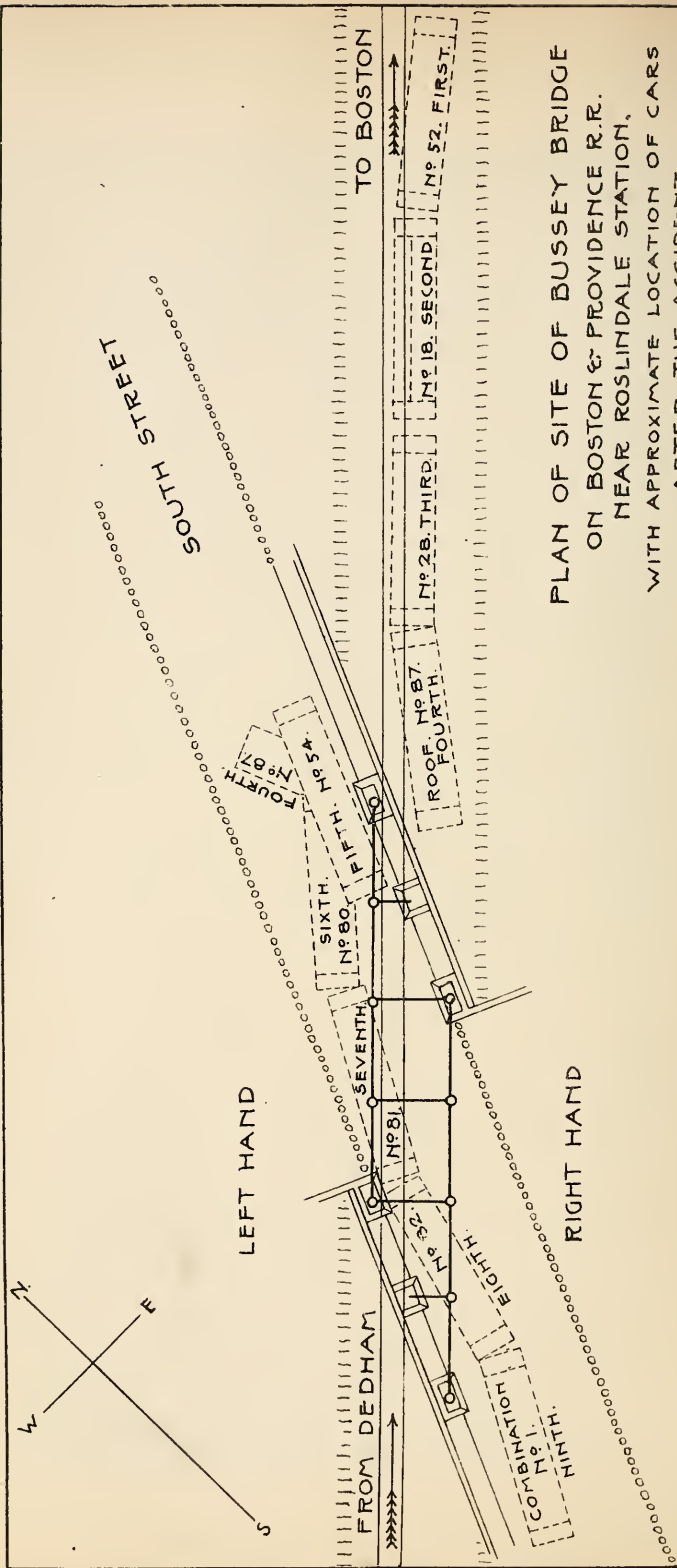
BOSTON, MASS.



HELICTYPE PRINTING CO.,

BOSTON, MASS.

THE 1ST, 2ND AND 3RD CARS AND THE ROOF OF THE 4TH CAR ON THE EMBANKMENT.



the bridge, extending some distance on to the embankment on either side. The sixty-foot rails, which began on the north embankment, extended on to the bridge to a point five or six feet south of the angle-block which held the broken hangers.

The track stringers, which rested on the cross floor-beams, were of iron, and on top of them was a six-by-nine hard-pine beam upon which the ties were laid. This beam was bolted to the iron stringers, and the joints in it did not coincide with the joints of the stringers. Moreover the iron track stringers were trussed in such a manner that when they had fallen a short distance the trusses would operate as a continuous chain.

A speed of fifteen miles an hour is equivalent to about twenty-two feet a second; of twenty miles an hour, to about twenty-nine feet a second; of thirty miles an hour, to about forty-four feet a second. A cannon ball falls sixteen feet the first second. The length of a car is about fifty feet.

THE WRECK.

The strain which broke the hangers was probably given when the engine driving-wheels passed over them, and there was a slight depression of the bridge when the engine left it. This depression had increased when the first car left the bridge, so that as it went up off the bridge it jumped the track to the east, and its rear truck was torn from it. The second car dropped still farther, receiving a much more severe concussion at the end of the bridge; but the train of seven cars behind it crushed into its rear and threw it up over the edge of the abutment, displacing both its trucks and leaving them under its rear end. When the second car struck the abutment the third car was driven against it with such force — that car being just upon the point of leaving the solid part of the bridge at the middle of the truss — that its Miller platform was crushed on top of and into the platform of the

second car, and became inextricably entangled with it. This may have saved the third car from going into the street, as it must have formed a very strong and close connection between the two cars, and must have greatly helped to carry the front end of the third car over the chasm. As it was, this car lost both trucks, its floor system was almost demolished, its sides were shattered and loosened at every joint, and it was found on the embankment a few feet behind the second car, having lost its front platform, which had finally been torn out and remained entangled with the rear platform of the second car. The fourth car was not able to leap the chasm. It had not however fallen so far that its roof did not come above the line of the abutment. The car was stopped by the abutment but the roof went on and landed on the embankment. The front end of the body of the car, striking the abutment at an angle of twenty-one degrees, was crushed in for about half its length, and the remainder of the car veered off to the left or west side of the track, and fell into the street, landing on its right or east side. The fifth car followed the course of the remnants of the fourth car, struck its rear end, and was telescoped by it for half its length. It seems probable that the Hewins truss stood up until the cast-iron joint-block, in which the broken hangers were, was struck by the fourth or fifth car. This blow knocked out laterally the block and the two adjoining members and the truss fell to pieces. The sixth car fell diagonally across the street. It was badly broken and twisted, and its top was nearly torn off. The seventh car landed in the street upright, and was the least injured of those which went through the bridge. The eighth car landed in the street, behind the seventh car, was tipped to the east side, and was badly shattered. The ninth car, being the combination smoking and baggage car, turned over and landed in the road upside down.

Most of the people who were killed were in the fourth, fifth, sixth and ninth cars.

SUGGESTIONS AND WARNINGS TO THE ROAD.

The evidence shows that there has been considerable anxiety on the part of passengers in regard to the safety of this bridge, and in various ways and at various times this anxiety has been brought to the attention of the management of the road. Though in some cases this anxiety was caused by the discovery of loose nuts on the Parker truss, it was generally a vague fear, founded on no known defect in the bridge, but apparently largely due to the skew of the bridge and to the fact that the track on both sides of the bridge ran on high embankments.

In December, 1881, the Board of Railroad Commissioners wrote to the superintendent of the Boston & Providence Railroad, in relation to this bridge, as follows: —

West Roxbury Bridge over the Highway, near Bussey Farms.

The superstructure of this bridge is an oddity among bridges. If it has never been tested under a given load, the Commissioners suggest whether it would not be wise and prudent to test it now, and perhaps at stated intervals hereafter, shorter or longer, a year or more, according to the behavior of the bridge under the load; the test to consist of putting on a load somewhat heavier than the bridge is ever called upon to bear in the course of your business; noting the load put on, the deflection taken by the bridge under the load, and the amount of recovery after the load is removed; noting also its lateral stiffness and strength. A series of such records would show conclusively whether or not the bridge tested was maintaining its strength and safety.

It appeared in evidence that shortly after the receipt of this letter a test of the bridge was made; but no record of such test was returned to the Board, nor was the test followed by a series of tests, which the letter of the Board indicated was necessary in order to show conclusively whether the bridge was maintaining its strength.

It appeared that examinations of the bridge had been made every spring and fall by George F. Folsom, the

superintendent of construction, and he described fully his method of going through the bridge and examining its details. He testified that he had detected no fault in the construction of the bridge, except that it would be better if made of fewer pieces; that he never had any anxiety about any portion of the bridge that was covered up; that he did not know how the floor-beams under the joint-blocks at the ends of the truss were supported, but supposed that they were supported on iron stirrup straps, which he thought were one and a half-inch square; that he could not examine these stirrup straps, and never thought they were an important feature of the bridge until he saw them lying on the ground. Such was the examination made by the superintendent of construction to ensure the safety of passengers riding over that bridge.

The hangers held up the floor-beams. When the floor-beams fell, the floor system would fall, and yet it never occurred to the man who was supposed to have superintended the construction of the bridge, and to whom was entrusted the examination of the bridge every spring and fall, — it never occurred to him that the strength and condition of these hangers was vital and should have been an important feature in his examination. Moreover, he did not know how the hangers were made, his supposition in regard to their size and shape was incorrect, and he did not have, nor did the road have, any drawings showing their construction and dimensions.

It is a defect in any bridge if a vital part, no matter what excess of strength it may have, is unnecessarily covered so that it cannot be inspected. In this bridge, not only was a vital part unnecessarily covered, but no one in the employment of the corporation knew anything about its construction or its strength, and, as a matter of fact, it was so constructed as to be sure to weaken under continued use and was insufficient to do its work with safety, even had it been so placed as to be subject to full and constant inspection.

In December, 1881, the Board issued a circular to the Boston & Providence Railroad and other railroads, respecting the proper construction of bridge floors, which circular was drawn up by Mr. Clemens Herschel, civil engineer, at that time a member of the Board. This circular is printed in the Commissioners' Report in January, 1882. It calls attention to the danger of knocking to pieces iron trusses composed of several members, in case a train is derailed upon a bridge, and urges the great importance of devices that are calculated to prevent one or more derailed wheels from swerving to any great extent from the rails, and of a tie system that will support derailed wheels and carry them over the bridge in safety without catching between the ties. The circular gives diagrams showing different forms of track structure for bridges, designed to meet these requirements, in all of which guard rails, guard timbers, and the laying of the ties not more than eight inches apart, form a conspicuous feature.

The circular closes as follows: "The Board of Railroad Commissioners commend to the railroads of this Commonwealth the consideration of the examples shown and of their several merits and defects, and the application upon the bridges within the State of a safe and efficient form of track construction, the essentials of which seem to be strong and closely-laid ties of sufficient length, guard rails or guard timbers, lined with angle iron; these guard timbers outside the track, and notched and bolted down, or else separate outside stringers, notched and bolted down to the ties."

After the annual inspection in 1882, the Commissioners further wrote to the superintendent of the Boston & Providence Railroad as follows: "The Commissioners refer to their circular of Dec. 1, 1881, for their views on the best method of track construction on bridges. The track construction on most of the bridges of your line is wanting in guard rails or proper guard timbers, and several of them need the ties laid closer."

There were no guard rails on the Bussey Bridge in 1881. There were none at the time of the disaster. Neither was there at either time any timber notched and bolted down, as suggested in the circular. There was outside of the track a plank, three inches high by ten inches wide, placed a few inches from the track, bolted to every third or fourth tie, but not notched.

Mr. George F. Folsom, superintendent of construction, stated that he had never known a train to be saved by a guard rail; that in one case a guard plank similar to the one on the Bussey Bridge had guided a derailed train which was moving slowly across a bridge on the Boston & Providence Railroad; that he had a feeling in regard to guard rails that probably there were cases in which they had done as much damage as, if not more than, would have been done if they had not been used, but he had never known such a case to occur; that it was a supposition, a feeling which he had in regard to it, and therefore he objected to putting guard rails on. In his views in regard to guard rails he has been in the past and was at the hearing sustained by the superintendent of the road.

Guard rails and guard timbers have been in use so long on the leading railroads of the country, and their value, when properly placed, is so generally acknowledged, that the position in regard to them taken by the superintendent of the road and the superintendent of construction is indefensible.

Further, Mr. George F. Folsom, being unable by reason of sickness to answer certain questions of the Board in regard to the construction of the floor system, communicated information relating thereto to Mr. A. A. Folsom, the superintendent, in the following letter, which was submitted to the Board:—

BOSTON, March 29, 1887.

A. A. FOLSOM, Esq.

DEAR SIR:—The ties on the Bussey Bridge all extended eighteen inches outside of rail on east side, and were all eighteen inches on centres.

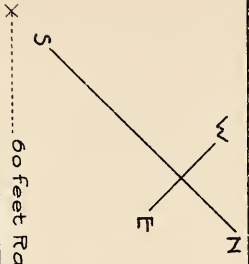
FLOOR SYSTEM OF THE BUSSEY BRIDGE.

APRIL 18th 1887.

SCALE 26ft to an inch.

Moses Brown

LEFT HAND



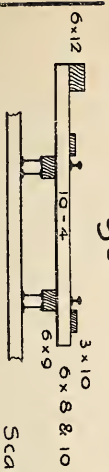
60 feet Rails

STREET.

BOSTON END

DEDHAM END

RIGHT HAND



Scale 6 feet to an inch.

TIES & SPACES MEASURED

14 Ties	6 in. x 8 in.
8 "	6 in. x 10 in.
22 spaces averaging	1.22 ft.
Least "	0.95 "
Greatest "	1.50 "

The short ties that butted against truss were seven feet five inches long; the ties at both ends of the bridge were ten feet long.

The ties were six by ten and eight inches apart. Guard plank outside each rail ten inches wide and three inches thick covered bridge and abutments. Yours truly,

GEORGE F. FOLSOM.

It will be seen from this letter that the superintendent of construction states that the spaces between ties on this Bussey Bridge were eight inches. Mr. E. S. Philbrick, the expert employed by the road, and Mr. Thomas Doane, the expert employed by the Commissioners, who took measurements of the ties and the spaces between them as they were found at the wreck, testify that the spaces between the ties on this bridge were from fifteen to eighteen inches, instead of eight inches as stated in the letter of the superintendent of construction.

In spite, then, of the circular of 1881, and of the letter of 1882, each of which called the attention of the superintendent of the Boston & Providence Railroad to the importance of having ties on bridges laid closely together, the ties on this bridge remained unchanged, and at the time of the accident were so far apart that had a train been derailed upon that bridge, the destruction of the bridge would have been inevitable; the spaces between the ties were so great that the wheels would have sunk down between them, and the bridge would have been wrenched and torn to pieces. Moreover, if a brake beam had fallen, it would, in all probability, have caught between the ties and wrecked the bridge. Neither the superintendent of the road nor the superintendent of construction would deny that the spaces between the ties on this bridge were too great. As it happened, the accident was not caused by the defects of the tie system, but the management is none the less censurable for its long-continued neglect to remove this undoubted element of danger.

THE BRAKES.

It appeared that seven of the nine cars on the train were supplied with the Westinghouse Automatic brake, but none of the brakes would work automatically because the other two cars had the old Westinghouse Straight-air brake. Had the train been supplied with automatic brakes throughout, they would have applied themselves when the first car parted from the engine at the abutment at the north end of the bridge; they would have materially diminished the violence of the concussion of the cars against the abutment and against each other, and there is reason to believe that the results would have been less disastrous.

A railroad company is bound to use the utmost diligence in supplying itself with well-approved contrivances for the safety of its passengers, and this railroad is guilty of neglect in not having, long ago, fitted all its cars with the Westinghouse Automatic brake. Economy in some portions of railroad management is commendable, but economy which risks the safety of passengers is culpable.

THE BRAKEMEN.

In section 170, chapter 112 of the Public Statutes, it is provided that every railroad corporation shall cause to be stationed on every passenger-train "trusty and skilful brakemen, equal in number at least to one for every two cars in the train." This, being a train of nine cars, should have been provided with five brakemen in order to comply with the provisions of the statute. There were in fact only three brakemen. The Board do not consider that the two assistant conductors can be considered as brakemen within the meaning of the statute. If they had duties to perform as conductors, in taking up tickets or otherwise, they could not be on hand to apply the brakes with that promptness which is necessary in case of an accident, and which is possible for a brakeman who is at his post of

duty on the platform. The eighty-second of the printed "Rules and Regulations" of the company, among other provisions, requires brakemen to be at their brakes when the train is moving, except when called away by the direct order of the conductor.

FIRE.

The cars were provided with the Chilson Conical Stoves, one of which was placed in the middle of each car. One fire caught in the third car, being the last car on the embankment, and was put out readily by the passengers. At least two fires also started in the wreck in the street, and these also were fortunately put out before they had acquired any serious headway. Water was near at hand, and the passengers and the people from the neighborhood realizing the danger took immediate measures to prevent the added horror of a conflagration. Their efforts were supplemented by Chemical Engine No. 4 of the Boston Fire Department, which arrived on the scene eight minutes after the accident. Though no one was suffocated or burned, the fire demon was at work in the ruins, and was only prevented from gaining the mastery by a fortunate combination of circumstances.

SUMMARY AND RECOMMENDATIONS.

The conclusions which have been reached by the Board are as follows : —

The contract for rebuilding the bridge in 1876 was made without proper examination as to the standing of the contractor.

Those who acted for the corporation in making the contract had not sufficient knowledge of iron bridge building to enable them to pass intelligently upon the design and specifications.

The design and specifications for the bridge were not such as should have been accepted.

The bridge was constructed practically without superin-

tendence on the part of the corporation, and the corporation neglected to preserve a copy of the specifications, drawings and strain sheets.

The tests of the bridge were not made in the presence of any one acting for the corporation who was qualified to judge of their value.

From the time of the construction of the bridge to the day when it fell, the railroad company had caused it to be examined by one man only, who, year after year, passed over vital parts of the bridge without realizing that they were of importance. This man had been in the employment of the corporation for a long series of years, his trade was that of a machinist, he had not been educated as a civil engineer, and the management had abundant reason to know that he was not qualified, and had had no opportunity to qualify himself, to do the work assigned to him with reference to this bridge.

The series of tests of the bridge recommended by the Board in 1881 was not made.

In the erection and inspection of bridges the management of a railroad is bound to exercise the utmost care. Had such care been exercised, there is every reason to believe that the disaster would have been prevented. On the thirty-second page of the last report of the Commission is the following: "The Board renews the expression of its belief that a preventible accident is a crime."

Notwithstanding the repeated warnings of the Board the spaces between the ties on this bridge were far too great for safety.

Notwithstanding the recommendation of the Board in 1881, no suitable guard rails or guard timbers were placed upon the bridge.

The Westinghouse automatic air-brake, a safety appliance, remarkable alike for its simplicity and effectiveness and long ago approved and adopted by all the leading railroads, was not in practical operation on this train, neither was the train furnished with a sufficient number of brakemen to comply with the requirements of the statute.

The disaster and the facts which have been disclosed, impose a grave responsibility on the board of directors. It is their duty, by the most searching inquiry, to ascertain forthwith whether any other work has been done in a like negligent and incompetent manner, whether in other matters reasonable and well-approved precautions against accident have been ignored or neglected, and whether false economy has been practised and safety sacrificed. They should not rest until they have taken the most energetic measures, without regard to expense and without regard to persons, to correct the past and to ensure better and safer management in the future. So far as relates to bridges, the Directors have already caused a thorough expert examination to be begun. Fortunately there are but few bridges on the line.

In mitigation of the sentence of condemnation called for by the foregoing findings and in support of the hope that the history of the Bussey Bridge is exceptional, it must be remembered that from 1869, when the Board of Railroad Commissioners was created, up to the time of this disaster, a period of eighteen years, there has been no train accident on the Boston & Providence Railroad which resulted in the loss of a life of, or even in serious injury to, a passenger.

The accident furnishes another proof of the necessity of abolishing the deadly car stove.

As bridges embody many possibilities of danger, it is proper that special means should be taken to secure careful, competent and faithful construction, and a thorough and scientific examination of them by the railroads at regular intervals, followed by a thorough State inspection. The importance of such action is emphasized by the fact that the weight of engines and of the rolling-stock of railroads and of the loads carried has been increasing for many years. The weight of engines and rolling-stock has doubled within twenty years. Moreover, the speed of the heavy passenger express and through freight trains has also largely increased.

The examination made by the Board of Commissioners can at best be but cursory. There are over a thousand bridges in the State, and no member of the Board, no matter what his scientific education may be, can, in addition to his other duties as commissioner, make anything but a brief, partial and unsatisfactory examination of them. A proper inspection in behalf of the State would require practically the whole time of a bridge expert.

The Board recommend the passage of an act requiring every railroad, at least once in two years, to have a thorough examination of all bridges on its lines made by a competent and experienced civil engineer, who shall report in writing to the corporation and to the Board of Railroad Commissioners the results of his examination, his conclusions and recommendations. The reports should embrace such information in relation to the history and construction of each bridge, including detail drawings and strain sheets, as may be called for by the Board of Railroad Commissioners, and said Board should be authorized to employ a competent expert to examine such reports and make such further examination of the bridge structures as may be deemed necessary or expedient.

GEORGE G. CROCKER.
EDWARD W. KINSLEY.
EVERETT A. STEVENS.

DERAILMENT OF A PASSENGER TRAIN ON THE BOSTON & ALBANY RAILROAD AT WEST SPRINGFIELD.

Passenger train No. 14 on the Boston & Albany Railroad, a through express train from the West, was thrown from the track at West Springfield station at about 6.15 A. M., January 4, by reason of a broken journal on the tender. The train, consisting of the engine, an express car, a baggage car, a smoking car, one passenger coach and two sleeping cars, left Westfield an hour late and was running thirty-two or thirty-three miles an hour, when that part of the train following the express car left the track at the switch just west of the station. The baggage car struck some freight cars standing on the siding, throwing them over, and was then itself thrown across the tracks, overturning the locomotive of a west-bound freight train which had just arrived on the north track. The smoking car and passenger coach were badly wrecked, and these, with the baggage car, immediately took fire and were entirely destroyed. The sleeping cars remained on the siding and the engine and express car continued on the main track—the latter with one truck only—and ran about 700 feet, when they stopped. The body of John Jenkins, a passenger, was found in the ruins of the smoking car, and a corpse which was in the baggage car was badly burned. Fifteen passengers were injured, most of them not severely, and the engineer and fireman of the freight train, and the conductor, baggage-master and one brakeman of the passenger train were also hurt, but not seriously. The mails, which were in the baggage car, were destroyed by fire.

The primary cause of the accident was the breaking of a journal in one of the trucks of the tender. The displaced wheel then partly turned the Lorenz switch so as to throw the cars from the track and partially upon the siding, where collision with the standing freight cars wrecked all but the sleepers and threw the baggage car across the tracks against the freight locomotive. The fire, without doubt, caught from the stoves in one or each of the burned cars. Searl's heater was in the smoking car, a Chilson stove in the baggage car and the Baker heater in the others, all bolted to the floor in the usual manner.

An examination of the broken journal showed that there had been a partial fracture some time previous to the final break. This fracture could not be seen by inspection, as the journal is entirely out of sight, nor could it be discovered by sound.

This broken axle had run upward of 97,000 miles. A sound axle of the same manufacture and supposed to be of the same quality,

which had run 120,000 miles, was broken under hydraulic pressure and showed a clean break and uniform texture of good iron throughout. The manufacturer testified that the axles furnished the Boston & Albany Railroad Company are always of excellent quality, made from railroad scrap-iron, which is considered the best except Lowmore iron. They are made by experienced men and are carefully examined; the manufacturer saying that he would rather have a hundred axles condemned in the shop than have one defective axle go out. It was also testified that there was no indication of a flaw in this broken axle when it left the shop and that the iron was of superior quality. The size of the axle was three and three-fourths inches in diameter, the standard fixed by the Master Car Builders' Association. Mr. Underhill, superintendent of motive power of the Boston & Albany, stated that in view of this accident it might be advisable to increase the size of the axle. There was no intimation that the coldness of the weather was in any way a cause of the fracture of the journal.

It is not clear whether the fire originated in the baggage or smoking car, or started independently in each. The stove in the baggage car was a Chilson cone, bolted to the floor, and the door was locked. In the smoking car was a Searl's heater, also bolted to the floor, and enclosed in a cage or closet lined with zinc. The violence with which the baggage car was thrown against the freight cars and then across the track so as to overturn a locomotive, was enough to loosen the fastenings or break any cast-iron stove and scatter the burning coal. The result is another warning that a better and safer method of warming cars should be adopted. The possibility of warming the cars by steam from the locomotive effectively and safely is now attracting much attention, and the Commissioners have already expressed their satisfaction that the Boston & Albany has for a long time been faithfully trying an experiment in this direction, with a view of adopting this system of heating, if it proves as successful as it now promises to be.

Naturally a general desire exists that the terrible consequences too often arising from the use of fire in the cars should be avoided as far as may be and a call for legislation may be expected. In regard to local travel within the State this is a question for a careful consideration of details. In regard to travel including points in different States other questions arise. It would be at least doubtful whether any State regulation would be constitutional which prescribed any form of safety device for cars engaged in interstate traffic. In the like matter of safety devices for steamboat transportation from State to State, Congress has been supposed to have sole jurisdiction. It is to be remembered that traffic between Boston

and Providence is interstate commerce, just as truly as if the line ran from Maine to California. The chances of different regulations by different States, and of conflicting claims by rival inventors, are to be considered. While such considerations may unfortunately create difficulties and cause delay in legislation, they do not affect the duty of all railroad managers to use the utmost diligence in adopting promptly the best possible devices for protecting travellers from the danger of fire. No law forbids the use of any such device. The law of humanity demands energy and promptness in guarding against this most terrible of dangers.

By the Board,

WILLIAM A. CRAFTS,

Clerk.

JAN. 24, 1887.

DERAILMENT ON THE GRAND JUNCTION RAILROAD, AT MAIN STREET, CAMBRIDGEPORT.

A freight train on the Grand Junction branch of the Boston & Albany Railroad, which left East Boston at 3.40 p.m. on Saturday, April 2, was partially derailed at the level crossing of Main Street, Cambridgeport. The engine, caboose and one car left the track near the middle of the crossing, and the tender tipped and fell over upon James Cannon, a brakeman, who had jumped from the engine, killing him instantly, and seriously injuring Frank Bates, another brakeman. The apparent cause of the derailment was the accumulation of snow and ice by the side of the rails, so as to lift the flanges of the wheels of the forward truck above the rail. It appeared from the evidence that the gate tender kept the crossing clear to the best of his ability; but there was a heavy snow storm, and the frequent passing of street cars and other vehicles filled the groove between the rail and the planking with such a solid packing of snow as to make it impossible for the gate tender to keep it perfectly clear without assistance.

The Board is of opinion that at all grade crossings where there is a large amount of travel extra help should be furnished during severe snow storms to make the passage of trains safe. Such a precaution in this case would have prevented the loss of life.

By the Board,

WILLIAM A. CRAFTS,

Clerk.

APRIL 12, 1887.

COLLISION ON THE BOSTON & ALBANY RAILROAD
AT NORTH GRAFTON.

On the 27th of September local freight train No. 22, on the Boston & Albany Railroad, from Worcester for Boston and intermediate stations, stopped at North Grafton to switch some cars to a siding. While the train was standing on the main track No. 70, a freight train from Worcester collided with the rear cars, throwing a number of them from the track, blocking the road for several hours, and killing J. E. Zahn, a brakeman.

At the investigation it appeared that the morning was misty and the rails were slippery, but it was evident that the cause of the accident was the failure of the rear brakeman of train No. 22 to go back far enough to warn the following train, and in consequence of the mist he was not seen by the engineer of No. 70 till the train was close upon him, and the distance was not sufficient to bring it to a stop before colliding with train No. 22.

The engineer of No. 70 testified that before he reached the flagman he saw the electric signal set at danger, whistled for brakes, applied the driver brake and opened the sand box to sand the rails. Upon seeing the flagman, he whistled again for brakes, and then he first felt that the brakes were slowing the train. Whether he had in fact previously signalled for brakes or not, it is clear that the flagman should have gone much farther back, and had he done so, his signal of a train standing on the track would have secured an earlier effective application of the brakes, and probably have prevented the collision.

Such accidents as this emphasize the need, on roads having a large traffic, with freight trains running at short intervals, of equipping freight trains as well as passenger trains with continuous brakes, operated from the engine. The Board hopes that the recent successful trials of such brakes at Burlington, Ia., may lead to their use on the more important through freight trains, and eventually on all.

By the Board,

WILLIAM A. CRAFTS,

Clerk.

Oct. 15, 1887.

COLLISION OF AN EXPRESS PASSENGER TRAIN WITH
A FREIGHT TRAIN ON THE FITCHBURG RAILROAD,
NOV. 30, 1887.

In the matter of the rear collision between the Raymond excursion vestibule train, extra, and a freight train near Fitchburg on the morning of the 30th of November.

Hearing at 10.30 A.M., December 1, 1887.

Train 37, being the through night express passenger train, left Fitchburg for Boston at 4.02 A.M. on time. The vestibule train was extra 37. The freight train was No. 57. This train was running under the following order received by Robert S. Johnson, its conductor: "29th November, 1887. R. S. Johnson. Run to Fitchburg ahead of extra 37 of 30th November. E. A. Smith, train dispatcher." The conductor of extra 37, Albert B. Cutting, received the following order: "57 run ahead Westminster to Fitchburg; answer red signals on 37 Fitchburg to Boston. E. A. Smith, train dispatcher."

Both of these orders were duly received and receipted for. Freight 57 was stopped by a switching engine for from five to seven minutes, just as the engine reached the crossing near the station at Fitchburg. A brakeman was sent out to protect its rear. Upon starting again the brakeman was called in, and the train proceeded to the new freight yard, about $1\frac{3}{4}$ miles east of Fitchburg station, going at moderate speed, probably never more than eight or ten miles an hour, and not averaging so much as that.

The conductor of the freight train testified that it arrived at Fitchburg at 5.25, and that after starting again, when a short distance east of the Fitchburg station, he looked at his watch, and found the time to be 5.42. The engineer of extra 37, Charles F. Richardson, testified that he left Fitchburg at 5.45. The conductor of extra 37 inquired at Fitchburg for orders, and received none, but, on inquiry of a car inspector, was told that a cattle train had passed ten or fifteen minutes before. This information was also communicated to the engineer.

There is a curve in the road about a thousand feet west of the switches for the new freight yard. When the engine of extra 37 had rounded this curve the engineer saw a man swinging a white lantern, and also caught sight of the rear lights of the freight, then about 500 or 600 feet from him. He applied the brakes, reversed the engine and opened the sand box. He was, however, unable to stop his train, and his engine ran into the rear of the freight train with great violence, demolishing the end of the saloon car, and crushing through a car filled with cotton, another with barrels of oil, and a fourth with

cotton. The engine and the débris of these cars and their contents, and the front end of the baggage car of the extra, were forthwith enveloped in flames. The engineer and fireman jumped just before the engine struck the rear end of the freight train. When the engineer got on his feet, which he did at once, the whole wreck was in a blaze. The conductor of the freight was in the saloon car at the rear end of the train. His attention was attracted by the light from the head light of the engine of the extra. He had just time before the collision to jerk himself out through the window, and then rolled down the bank into the river. Mr. Joseph Joslyn, a drover, who was also in the saloon car, and the fireman of extra 37, received injuries from which they died on the following day. There were but few passengers on the train, and they apparently escaped without injury. When the conductor of the freight train came up the bank from the river he looked at his watch and it was 5.55. He considers that the accident happened at 5.52. He found that he was near the rear end of the passenger train, showing that the trains after the collision must have moved forward about the length of the passenger train. The passenger train, consisting of six vestibule and one baggage car and engine, was between 450 and 500 feet long. The man who swung the white light was a brakeman from another train going home. He testified that the freight train when it passed him was, in his opinion, going six or seven miles an hour. The severity of the collision makes it evident that the difference in the rate of speed must have been as great as this.

The conductor, Robert S. Johnson, and engineer, Moran A. Dole, of the freight train, understood that, in accordance with their orders, they had the right of way, not simply to the Fitchburg station, but to the side tracks in the new yard. In support of their position they claimed that the new yard was the proper place for side-tracking their train; that arrangements had been made for side-tracking it there and nowhere else; that an order, issued by division superintendent, J. F. Adams, to all trainmen, Tunnel division, and dated November 12, 1887, was as follows: "Commencing at 6 o'clock A.M. Monday, November 14, all Tunnel division freight trains, unless otherwise ordered, will run to and start from the new yard east of Fitchburg, instead of from the west yard as formerly. Telegraph train orders will be given at the new yard. Saloon cars will be left there also. Trains, excepting the local, having cars for Fitchburg, must have them ahead and set them off in local yard before going to the new yard." That, in another order, issued on November 12, also to take effect on November 14, it was provided as follows: "The limits of the Fitchburg yard will extend from the River Street crossing to the yard office at the west end of the new freight yard, east of

Fitchburg." That this order included in the Fitchburg yard the switches at the west end of the new yard; that, therefore, on passing on to the side tracks at these switches they had not left the Fitchburg yard; that their orders to run to Fitchburg ahead of extra 37 gave them the right to go to the side tracks at these switches, and they did just what, as they understood their orders, it was intended they should do.

The train dispatcher, Mr. E. A. Smith, took a different view of the case. He claimed that the order to run to Fitchburg ahead of extra 37 extended only to Fitchburg station, and from that point the rear of the freight train should have been protected by a flagman, and he called attention to special rule 301: "The passenger station is the point to and from which all trains are timed at Fitchburg." And also to an order issued November 21, 1887, to take effect November 28, which contains the following: "The new freight yard at Fitchburg will be known hereafter as East Fitchburg." The train orders were not given by Mr. Smith himself, but by his assistant.

It appears, then, that a new yard had been lately established, and that the name of East Fitchburg had been given to it, to take effect only two days before the accident. The old Fitchburg yard, by the order of November 12, extended to the yard office at the west end of the new freight yard, so that the old Fitchburg and the new East Fitchburg yards joined each other at this point. The new East Fitchburg yard was built to take the place of the old Fitchburg yard for through freight business, and an order to that effect had been issued about two weeks before. Under these circumstances, and inasmuch as the switches by which freight trains coming from the west would leave the main track for the new yard were within the limits of the old yard, it seems that there was a complication and an element of uncertainty as to the intention of the officials of the road in relation to the use of these respective yards, especially under an order to a Tunnel division freight train to run to "Fitchburg," etc.

This complication and uncertainty does not, however, relieve the conductor of the freight train from censure. He was not justified in running beyond the station at Fitchburg without protecting the rear of his train. Especially was he at fault in so doing, in view of the fact that he was running on the main track to a point so near the limit of the Fitchburg yard that he could not get the rear end of his train off the main track without running the front end into East Fitchburg, while his orders extended only to Fitchburg. His duty to have taken such course as would involve no danger is clearly laid down in special rule 78, and general rules 1 and 2. Rule 78: "In any case where there is room for doubts as to the right of the road, or the safety of proceeding from any cause, adopt

the safe course." Rule 1: "The safety of passengers is the first consideration; to this with the safety, regularity and punctuality of trains, and the comfort and convenience of passengers, all operations of working or repairing the road must be completely and entirely subordinate." Rule 2: "All employees are expected to exercise the greatest care and watchfulness to prevent injury to persons or property. They must in all cases of doubt, or when instructions are not understood, take the course which involves no danger, and which will not in any way compromise the safety of the road, seeking afterwards the necessary explanation of the proper officer." . . .

The conductor of the extra, Albert B. Cutting, is free from blame. He inquired for orders at the office in the Fitchburg station and received none. He also took the extra precaution of inquiring of a car inspector, and was told by him that a freight train had passed ten or fifteen minutes before, and this information was communicated to the engineer.

The engineer of the extra is plainly guilty. In spite of rule 107, which is as follows: "All trains, except regular passenger trains, must approach and pass cautiously through all yards," and in spite of the fact that he was notified that a freight train had passed the Fitchburg station ten or fifteen minutes before, he was not proceeding with caution. He claimed that his train had the rights of train 37, which was a regular passenger train, and that therefore he was excepted from the requirements of approaching and passing cautiously through yards. This claim is an ingenious one, but the Board does not consider it sound. The rules, however, in relation to this matter are ambiguous if not conflicting. The word "regular" was undoubtedly used in the rule with the intention of excluding "extra" passenger trains. Reference is made in various places in the rules to regular trains, and to the trains having the same rights as regular trains. In special rule 115, relating to the Worcester yard, all three of these classes are enumerated. Rule 19 of the same series is as follows: "A red signal borne by a train shows that a train is following which has the same rights as the train bearing the signal, except within some of the yard limits. [See yard limit rules] A train following a red signal will in no case use any special right given the train bearing the signal." This rule indicates that a train following a red signal has the same rights as the train bearing the signal within the limits of certain yards, but not within the limits of others, and in that connection refers the employee to the yard limit rules. The yard limit rules, however, do not show that an extra has the same rights as the train whose red signal it follows in some yards and not in others. Either it has the same rights as the train bearing the signal, in all yards, in accordance with the interpre-

tation given to the rule by the engineer, or it does not have the same rights in any yard. The rules in this respect should be amended and made clear and consistent. Their ambiguity, however, does not relieve the engineer from blame, because in all cases of uncertainty, in accordance with general rule 2, aforesaid, he should have taken the course which involved no danger, and this was to proceed with caution through the yard limits. The notification that the freight train had passed ten or fifteen minutes before was, in itself, sufficient to make it his clear duty to run through the Fitchburg yard, and especially around the curve, with the utmost caution, so that he could easily avoid the possibility of a collision.

Rule 30 is as follows: "Any train following another train will keep a good lookout for the preceding train, and run with great caution on curves and on down grades when the position of the forward train is unknown." As a matter of fact, the extra went around the curve at a rate of speed which, under the circumstances, showed gross carelessness. The engineer is not excusable on the ground that the brakes worked poorly, because that fact had been brought to his attention by difficulty in stopping at other stations along the road, and rendered it incumbent upon him to go with still greater caution than would otherwise have been requisite.

The investigation has shown that the rules of the company governing freight service are by no means as perfect as they should be. Until a short time ago there were five different sets of rules to govern the lines operated by the Fitchburg Railroad. These rules have been lately consolidated, simplified and improved, but they are not up to the proper standard of clearness, conciseness and consistency. They open or leave unclosed too many cases in which, as in the present case, the management has to rely upon the omnibus rule, that in cases of doubt the employee is to take the course which involves no danger.

The Board recommends that the rules governing freight trains and the form of orders issued to them should be revised and amended, and that the Fitchburg and East Fitchburg yards should be protected by suitable signals, and it requests a report to be made to it within one month from date, stating what modifications of the rules or of the form of orders, and what additional system of signals have been adopted.

The wreck took fire at once, the car load of oil which was scattered in all directions making it easily inflammable. This oil may have been ignited by a spark from the locomotive, by a spark made by the striking together of the two pieces of iron or steel; it may have been communicated from the engine, the front end of which was broken in, or it may have come from the stove in the saloon car of the freight

train, which car and stove were demolished. It is not probable that the live coals in this stove found a resting place without setting fire to some portion of the wreck. The stove in the baggage car of the extra passenger train was not thrown from its position, and is not guilty of having contributed to the conflagration. The front end of this baggage car immediately took fire on the outside, and was undoubtedly covered with oil. This baggage car was consumed, and the same fate would have attended the rest of the train had not the engine of a following freight arrived in time to drag off the other cars. Fortunately, there was time to get the baggage out of the baggage car in safety. For the Board,

GEORGE G. CROCKER,

Chairman.

DEC. 17, 1887.

COLLISION BETWEEN PASSENGER TRAINS, NEAR SOUTH MILFORD STATION, ON WEDNESDAY, DEC. 14.

Hearing December 19, 1887.

Train 166, consisting of a combination car and a passenger car, which left Ashland at 4 p. m., collided at a point near South Milford with the west-bound passenger train No. 167, which left Boston at 3.30, also consisting of a combination car and a passenger car. The engines were badly smashed and the front ends of the combination cars broken, while the passenger cars on each train escaped without injury. The baggage master, Samuel C. Neill, who was on train 167, was crushed to death between the combination car and the tender, probably just as he was upon the point of jumping to save himself. The conductor on said train received injuries which prevented his attendance at the hearing. The passengers escaped with slight injuries, if any. The engineers and firemen of both trains jumped before the collision and escaped unhurt.

It appeared at the hearing that the New York & New England Railroad began on the 1st of October, 1887, to operate the Milford branch, formerly the Milford & Woonsocket Railroad; that Waldo W. Jenckes had been superintendent of that road about three years, prior to the time when the New York & New England took control; that Mr. P. Shinn, vice-president of the New York & New England Railroad, engaged Mr. Jenckes to act for the New York & New England Railroad, with reference to this branch, as its general agent, and that Mr. Robert E. Eavenson, the superintendent of the eastern division of the New York & New England Railroad, told Mr. Jenckes that he made no change in his duties, except in relation to certain pay-

roll matters ; that a new time table was sent to Mr. Jenckes, either on the 9th or 10th of December, and received by him on the 10th, to go into effect on the 11th ; that on the 10th Mr. Jenckes had a conference with Mr. Eavenson, and, in accordance with his suggestion, called a meeting of the train employees for Sunday, the 11th, at 10 A. M. ; that at such a meeting both the engineers and conductors of the colliding trains met in the office of Mr. Jenckes for the purpose of making sure that they understood the new time table.

Mr. Jenckes suggested that they should ask questions if there was anything about the tables which they did not understand. James W. Smith, engineer of the west-bound train, spoke about the rights of trains 166 and 167, and though it was somewhat in dispute as to what was said, it is clear that at that time the respective rights of the two trains were correctly understood, both by Mr. Jenckes and by the train employees, namely, that their crossing point was Milford ; that train 166, in consequence of special rule Q, had the right to run from Ashland to Milford regardless of train 167 ; and that train 167, by virtue of the general rule that all trains going west have the right of way over trains coming east, except it is otherwise specially provided, had the right to run from Franklin to Milford regardless of train 166 ; in other words, that each train was to wait at Milford for the other.

On Monday the 12th and Tuesday the 13th of December these two trains ran according to the time table and rules, passing each other at Milford. On Wednesday east-bound train 166 arrived at Milford on time, then left the station and drew off on a siding to await the arrival of train 167. It had remained there about ten minutes when Mr. Jenckes, the general agent, came along, went down the tracks some 700 feet, inquired of the switchman whether he had heard anything of train 167, and finding that he had heard nothing, he returned to the train, told the conductor and engineer that it was all right for them to go to Bellingham Junction (the second station beyond), made some allusions to the fact that the other train was more than ten minutes late, and got on to the engine. The train, in accordance with his orders, was then started and ran out on to the main track, and began running at about fifteen miles an hour. He then told the engineer to run slowly around curves, and the engineer accordingly reduced his speed, so that when he rounded the curve near South Milford he was running seven or eight miles an hour, being then about two and three-fourths miles from Milford. The engineer thought that the west-bound train was about 150 feet from him when he first caught sight of it around the curve, and he immediately reversed his engine and applied the brakes. The engineer, fireman and Mr. Jenckes jumped just before the collision and escaped unhurt. The west-bound train left Franklin eleven minutes late, the train from

Boston having been behind time. The engineer, James W. Smith, knew that he had the right to run to Milford and felt no anxiety about doing so, as he was confident that the respective rights of the two trains had been understood correctly on the previous Sunday. He did not stop at South Milford, and when he first saw the headlight of the east-bound train he was going at an estimated rate of thirty miles an hour, and thinks the other engine was 800 or 1,200 feet from him. He reversed the engine, applied the brakes and jumped just before the collision.

There is no dispute as to the responsibility for the accident. Mr. Jenckes was confused. He was under the impression that the numbers of the trains were different from what they were, and he had in mind a rule of the Milford & Woonsocket Railroad Company, which would have given train 166 the right to proceed, since train 167 was more than ten minutes late. He did not attempt to avoid the responsibility for his mistake, but showed that, although he had made a serious and fatal blunder, he was nevertheless to be credited with unflinching truthfulness under most trying circumstances. The mistake made was such as to show that he is not qualified for the special duty of dispatching trains, which requires the utmost coolness of judgment, clearness of thought and accuracy of expression.

There is no telegraph service on this branch. The telephone service, formerly in use, was taken out shortly after the New York & New England took control in order to get the Western Union Telegraph Company to furnish telegraph service. That service has not yet been supplied, and it is probable that had it been in use Mr. Jenckes would have availed himself of it, and the accident would have been averted. He testified that he thought of going to the telephone to find out where the west-bound train was, and then remembered that the telephone had been removed.

For the Board,

GEORGE G. CROCKER,

Chairman.

DEC. 24, 1887.

COLLISION ON THE FITCHBURG RAILROAD AT LITTLETON, DEC. 17, 1887.

Hearing Tuesday, the 20th of December.

It appeared that the gravel train, of which F. E. Quimby was the conductor, was passing down the siding between the east and west bound tracks at the rate of eight or ten miles an hour on its way to

Cambridge, and that freight No. 39 came down the main east-bound track, and the two engines collided at the intersection of the two tracks, the engine of the gravel train which had been brought nearly to a standstill being struck in the side by the engine of the freight. The two engines were badly injured, the freight engine being thrown twenty feet down the bank. Several of the freight cars were smashed, and were afterward consumed by fire. The head brakeman of the freight, Michael Mack, was killed, and the engineer and fireman were injured.

The evidence showed that as the gravel train was drawing through the siding its conductor heard the whistle of the approaching freight, near Littleton, and when that train came in sight he waved his flag from the rear platform of his train, as a signal to it to stop; that the engineer of the freight train saw the signal, and called for brakes, probably in season to prevent a collision, but on going over to the fireman's side of the engine to see what the trouble was he found the red flag had disappeared, found his track was clear, called off brakes, and returned to his side of the engine; that the conductor of the gravel train then made another attempt to stop him by swinging his flag at the side of his cars, standing on the steps, but that the engineer of the freight did not notice the signal. The conductor of the gravel train then called to his brakemen to set their brakes, and the engineer of the gravel train at about the same time discovered the danger, reversed his engine and applied sand, but was not able to stop his train. The front part of the engine of the gravel train had passed on to the main track when it was struck by the engine of the freight. The gravel train was probably nearly at a standstill at the time when the collision occurred.

The responsibility for the accident rests upon the conductor of the gravel train who failed to protect his train in the manner required by the rules. Rule 88 is as follows: "Signals for the stopping of a train should always be displayed between the rails of the tracks on which the train should approach." This rule is clear and distinct, and should have been conformed with to the letter. The conductor to save a little trouble for his brakeman violated his well-known duty, and the result is that a fellow employee has been killed. When he heard the engineer of the freight train call for brakes he thought that he had accomplished his object without complying with the rules. He ran the risk. He thought he was going to be successful and he failed.

The accident indicates laxity on the part of the employees of the road in complying with the rules and regulations, and suggests the possibility that they may have been negligent about reporting violations of the rules by other employees when no accidents have re-

sulted. A terrible responsibility rests upon the man who fails to report a violation of the rules. Not only is it a neglect of his duty to his employer, but it is a still more serious neglect of his duty to his brother employee. Rule 11 is as follows: "It is the duty of all employees to aid the superintendent in enforcing the regulations of the road and to report any violation of them within their knowledge. No excuse will be received for a failure to discharge their duties in this respect."

Failure to report a violation encourages a repetition of the violation. It results in a gradual lowering of the standard. Employees become careless, and danger creeps in on all sides and in unexpected ways. If there is an employee who has failed to report a violation of the rules, that man is in some degree responsible for the death of Michael Mack. It is not probable that Conductor Quimby would run the risk of neglecting to station a flagman on the main track if the employees were in the habit of reporting every violation as required.

For the Board,

GEORGE G. CROCKER,
Chairman.

DEC. 31, 1887.

FATAL ACCIDENT ON THE FITCHBURG STREET RAILWAY.

On the 4th of July, 1887, at 8.45 in the morning, an accident happened on the Fitchburg Street Railway, on the descending grade on Summer Street between Goodridge Street and the street to the cemetery. One person, Mary E. O'Brien, received injuries from which she died within half an hour, and eleven received injuries, none of which were probably permanent.

At the hearing in Fitchburg on the 12th of July it appeared that, on the morning of the fourth there was a great crowd of people going out to see the ball game at the Park grounds, and the utmost carrying capacity of the road was brought into requisition. Among the cars used for the purpose was car No. 7, which was a small covered car built for one horse, but furnished on this occasion with two horses. The standing room, as well as the seats on this car, was filled with passengers, and there were several passengers sitting on top of the car. Behind this was No. 9, a large open car, also drawn by two horses, the running board at the sides being filled with passengers as well as the body of the car. The passengers on this car numbered about eighty-four.

Open car No. 9 started down the grade when covered car No. 7 had got about 200 feet ahead. From the top of the hill to the bottom is about 750 feet. For about 600 feet the grade is about $5\frac{1}{2}$ feet in 100, and for the remaining 150 feet considerably less.

The people on the open car had been making considerable noise, shouting and blowing horns, and were happy and in a frame of mind in which undue excitement, in case of an unusual occurrence was natural.

When open car No. 9 was about half-way down the hill it was discovered that it was rapidly gaining on car No. 7, and that there was danger of collision. The driver of car No. 9 must have started his horses down the hill considerably faster than the driver of car No. 7, and he, as well as the passengers, was evidently alarmed when he found how rapidly he was gaining on the car ahead. When about half-way down the hill he applied the brake with all his power, and in so doing probably received assistance from a passenger on the platform. The evidence was conflicting as to whether he shouted to the conductor and driver of the car ahead to go faster, but there is no question that there was shouting to that effect, either by him or by the passengers. When a little more than half-way down the hill there was a cry raised by some of the passengers on open car No. 9 of "Jump" and "Jump for your lives." The testimony is conflicting as to whether the horses at that time were going on a trot or on a gallop. A police officer, who was walking down the hill at the time, thought the car was going at the rate of six miles an hour, but it probably reached a speed considerably in excess of that. The conductor was at the time on the running board at the side of the car, and endeavored to prevent the passengers from jumping off. In spite of his efforts a panic seized them, and about one-half of the passengers on the car either jumped, fell or were pushed off before the car came to a stand-still just beyond the end of the steeper part of the grade, and about two hundred feet only from the point where the excitement began.

The driver on covered car No. 7 heard the shouts from behind to hurry up, and started his horses up, but not sufficiently quickly to prevent the open car from overtaking him, which it did at or near the foot of the steepest part of the grade, the driver of the open car being obliged to turn his horses outside of the track, and the eveners or whiffletree bars just touched the rear platform of covered car No. 7, but there was no concussion or violent blow, and no resulting jar to either car. The passengers on covered car No. 7 also became alarmed when they heard the shouts in the rear, and several of them jumped off, some receiving injuries. Neither car left the track, nor was in any way injured. The passengers who remained on the cars

were carried in perfect safety, and received no jar of any kind. Had the leading car been going considerably slower, and the following car considerably faster, and the cars had actually collided, it is difficult to see how any serious accident could have resulted if the passengers had retained their positions on the cars.

The rails, which were T rails, had just been laid, and they and the road-bed were in excellent condition. Open car No. 9 was a new car, having been in use only a few months, and was also in first-class condition. It was furnished with eveners, and not with a pole, but the horses can do so little comparatively towards stopping a car by holding back on the pole that the Board does not regard the use of a pole, however desirable it may be for other purposes, as requisite to supplement the brake. In this case the brake was in excellent order, and did in fact stop the car as quickly as could have been expected. It was provided with the patent ratchet handle, thereby enabling the driver to exert his strength to the best advantage. There was testimony that the brake at the rear end of the car was also applied. The construction of the brake was such, that if the rear brake was applied it may have increased but could not have diminished the power of the brake operated by the driver.

At the suggestion of the Board the same car with the same driver and horses was tested in their presence over this same piece of road. The car was started at the top of the hill at a smart trot, and when half-way down the hill, one of the horses being in a trot and the other on a gallop, the signal was given to stop, which was done very quickly. Subsequently the car was loaded with 120 bags of corn weighing 100 pounds each, being six tons, or about the probable weight of the 84 passengers, and it was found that the brake was amply sufficient to control the car, and would stop it when going even at a higher rate of speed than was acquired at the first experiment within 150 feet from the place where the signal to stop was given. It also appeared that on the 8th of July 104 passengers were carried in the same car in safety down the same grade. The Board is satisfied, therefore, that the rolling stock was not only not faulty, but was in superior condition, neither was there any evidence that the horses were unsuitable. The driver testified that they were somewhat excited by the noise on the car and pulled on the reins. But there was no evidence tending to show that they were unmanageable or unfit. In fact, the examination of them made by the Board satisfied the members that they were an unusually good and sensible pair for horse railway use. Undoubtedly there was an error of judgment on the part of the driver in starting down the hill under the circumstances as fast as he did, but there is no reason to believe

that any of the passengers would have been injured if they had retained their places on the cars.

Special dangers always attend travelling on gala days, and such days demand the exercise of extraordinary care on the part of persons managing steam railroads and horse railways, and their employees.

While crowds are always excitable and dangerous, transportation companies would not be justified in carrying only such portion of the public as can be accommodated without crowding. Corporations cannot afford to keep, nor would the public be willing to pay for, the maintenance of an equipment all the year round which should be sufficient to accommodate the public on great holidays without crowding.

The crowding of cars on extraordinary occasions cannot therefore be considered as mismanagement, if the corporation furnishes the amplest accommodation in its control, or within reason, obtainable. Of course, on such occasions, it is necessary to employ extra help, and such help cannot be as safe as the regular and experienced employees. The selection of extra help should not by corporations be left until the emergency is at hand, but for all responsible positions should be determined upon after an actual test of fitness and an examination as to familiarity with the requisite duties.

In the present case the driver had been taken from the position of feeder at the stable, and though he had had a large experience with horses and in driving, he had only driven a horse car occasionally, — but the management of the road appears to have had good reason to believe him qualified to drive a car in safety, and his driving in the presence of the Board showed that he knew how to drive and manage the brake satisfactorily.

For the Board,

GEORGE G. CROCKER, *Chairman.*

[D.]

GRADE CROSSINGS.

PETITION OF THE NEWTON STREET RAILWAY COMPANY
FOR AUTHORITY TO CROSS THE TRACKS OF THE BOS-
TON & ALBANY RAILROAD AT GRADE.

Hearings Nov. 28 and Dec. 5, and the premises were viewed on Dec. 5, 1887.

It appeared that the Newton Street Railway Company was incorporated under chapter 341 of the Acts of the year 1886, and that section 3 of said act authorizes the corporation, subject to the approval and under the control of the Board of Aldermen, to construct and operate a street railway in certain designated streets and highways in said Newton, as location thereon may from time to time be granted by the Board of Aldermen of said city, provided the tracks of said corporation shall not cross the tracks of the Boston & Albany Railroad at grade without the consent of the Board of Railroad Commissioners. In two of the cases petitioned for, the street crosses the railroad track diagonally and in one, nearly at a right angle. In all three cases the grades of the street and the railroad should be separated. There is altogether too much travel over the four tracks of the Boston & Albany Railroad through Newton as well as too much over the streets in question to justify a continuance of the present crossings at grade.

The Boston & Albany Railroad, by its counsel, stated that it desired that the grades should be separated, and that the railroad is ready to bear its proportion of the expense. It is possible either for the railroad company or for the city of Newton to institute proceedings for a separation of grades before the county commissioners, who have authority, in case they decide that such separation is necessary, to prescribe the manner and limits within which it shall be made. At the time of the hearing no such application to the county commissioners had been made, and this Board cannot compel proceedings to be instituted. The requirement that the street railway shall cross

over the track on a separate bridge of its own, or under the track through a tunnel of its own, would operate practically as a prohibition against its crossing the track at all. There is no other present crossing not at grade by which two of these crossings could be avoided. The third crossing could be avoided by a detour of about a mile and a half, but such a detour would spoil the usefulness of the railway. The question therefore is, shall the Board give its consent to the three crossings at grade as requested, or shall it refuse its consent, thereby preventing street railway communication between those portions of Newton on the north and those on the south side of the Boston & Albany track, until such time as the grades may be separated by order of the county commissioners upon petition either of the city of Newton or of the Boston & Albany Railroad.

A similar question came up with reference to a crossing of the Fitchburg Railroad by the tracks of the Charles River Street Railway Company in the year 1882, and the opinion of the Board thereon will be found in the report of 1883, page 125. In that case, the circumstances of which were nearly parallel to those in the present case, the Board granted the petition on the ground that there was only one practicable route and that the Board was not justified under the circumstances in withholding its consent, notwithstanding it fully realized the danger attendant upon such a crossing, and the desirability of a separation of grades. In that case as in the present the president of the Fitchburg Railroad Company expressed his willingness to apply for a separation of grades so that Webster Avenue — the avenue in question — should be carried over the railroad, but nothing in that direction has yet been accomplished.

The Board is unwilling to follow the precedent which it established in the case of the Charles River Street Railway. Only a month ago three men were killed at one of these crossings in Newton. An increase of the dangers attendant upon them should not be sanctioned. Only a few days ago, at a grade crossing in Salem, a carload of forty passengers had a hairbreadth escape from being struck by a freight train. There is imperative necessity that these three grade crossings should be abolished. Delay will surely lengthen the list of victims. Every year the task will become more difficult and more expensive.

It is probable that the city of Newton and the railroad company would each like to have the other institute proceedings. Neither wishes to take the initiative, and in cases involving so large an expenditure nobody else can. If the matter is left in their hands there is reason to fear that nothing will be done. While, therefore, the Board cannot give its consent to crossings at grade as petitioned for by the Newton Street Railway Company, it is glad to avail itself of the

opportunity afforded by its annual report to call the attention of the Legislature to these three crossings, and to recommend legislation requiring an immediate separation of grades thereat.

For the Board,

GEORGE G. CROCKER, *Chairman.*

DEC. 31, 1887.

IN THE MATTER OF LAYING OUT BEACHMONT AVENUE
IN THAT PART OF BOSTON CALLED EAST BOSTON,
ACROSS THE BOSTON, WINTHROP & SHORE RAILROAD
AT A LEVEL THEREWITH.

Hearing Nov. 5, 1887.

The Board of Street Commissioners on August 12 passed a resolution that the safety and convenience of the inhabitants of the city require that a street to be called Beachmont Avenue should be laid out at East Boston, from Saratoga Street to a point on the line between Boston and Revere, in part upon private ways heretofore known as Butler and Atlantic Avenues and crossing the location of the Boston, Winthrop & Shore Railroad at a level therewith, and caused the resolve and order to be sent to this Board for its consent to the grade crossing.

The Board, having first viewed the premises, gave a public hearing, at which the city of Boston was represented by the street commissioners, and the Boston Land Company and the Citizens' Trade Association by their attorneys, and numerous citizens of East Boston and Revere appeared in aid.

Beachmont Avenue, as laid out, follows the line of Butler Avenue, a private way, across which the Boston, Winthrop & Shore Railroad was laid out at grade. This avenue leads off from Saratoga Street, within about 150 feet from the crossing at grade by the Boston, Revere Beach & Lynn Railroad over that street. The Winthrop Junction station is at the latter crossing, and from this station the Boston, Winthrop & Shore Railroad diverges, crossing Butler Avenue or the proposed Beachmont Avenue at a point about 550 feet from Saratoga Street, so that if the assent of the Board should be given to a grade crossing on Beachmont Avenue, as desired, there would be two grade crossings only 700 feet apart.

In support of a crossing at grade it was urged that the natural grade of the land near the crossing is the same as the grade of the railroad; that there are several grade crossings in East Boston, some

of which embody worse elements of danger than the proposed crossing; that the crossing by the tracks of the Boston, Revere Beach & Lynn Railroad at Saratoga Street is much more dangerous than the Beachmont Avenue crossing would be, because there are more trains running on the main line than on the branch; that, moreover, the trains on the branch line which stop at the Winthrop Junction station, whether leaving the station or approaching it, would not be going at a rapid rate; that the track on both sides of the avenue can be readily seen, as there are no buildings there; that if the avenue were laid out as a public street it would be necessary for the railroad to erect gates and have a gateman stationed there, so that it would be much safer than it is at present, being now and having been since the road was laid out a private way, and the crossing being entirely unprotected; that the town of Revere is growing very rapidly in population and that the pleasure travel to the beaches in the summer is enormous, this being the only direct route from East Boston; and finally, that it would cost some \$18,000 to carry the carriage road over the railroad, and the city of Boston has now no funds that could be appropriated to that end, so that the result of a refusal on a part of the railroad commissioners to assent to a grade crossing would be that the street would be continued to be used, as it has been in the past, as a private way, without any protection whatever for the public.

The case of the petitioners for a grade crossing appears, therefore, very strong, and yet the Board does not feel justified in granting its approval.

The other grade crossings in East Boston are not there with the approval of this Board, and the annual reports of the Board are full of instances showing the confirmed conviction of the Board, not only that grade crossings should not be permitted in places where there is or is likely to be a large amount of travel, but where grade crossings exist under such circumstances that they should be abolished, even at what would at first sight appear to be an excessive expenditure. Such crossings are being abolished every year in the large cities in this country and in Europe at the cost of hundreds of thousands or millions of dollars, where the original cost of avoiding them would have been reckoned by the thousands or by the tens of thousands. In many of the largest cities the work of abolishing grade crossings has already been nearly accomplished, but Boston still has a large number which are not only elements of great danger, but which are also serious impediments to pleasure travel and business traffic.

When houses are built on Beachmont Avenue it will become impossible to see approaching trains, and the expense of remedying the evil will then be greatly increased. Moreover, it is probable that

every year more and more express passenger trains will be run through to Winthrop or the shore without stopping at Winthrop Junction.

It was stated at the hearing that the town of Revere has within the past five years increased in population more rapidly than any other town in the State, and it is well known that the summer travel to the beaches has been very great, and is an element which is bound to assume enormous proportions in the future. Moreover, this summer travel is of peculiarly dangerous character. There is no time when people are so likely, unwittingly, to run into danger as when they have thrown off all cares and given themselves up to unalloyed enjoyment. A death trap placed in their way would be sure to capture its victims from time to time.

This is not the case of a country road over which the travel is not likely to increase largely in the years to come, but it is a thoroughfare between a great centre of population and a great summer resort. The amount of the travel over it is likely to be far in excess of the travel over such grade crossings as those in the town of Winthrop. The fact that the city of Boston is poor, or just at this moment wants all its available funds for other purposes, does not justify the Board in sanctioning a public danger which will continue from year to year until the constantly increasing necessity of its abatement shall, as it surely will, so outrun the constantly increasing difficulty and cost of the abatement that our successors will be obliged at enormous expense to correct our error.

At the present time the difficulty and the expense of making an overhead crossing are not excessive. Moreover, there are other ways of building an avenue to Revere. An overhead crossing could be constructed on Austin Avenue, the land bordering on which is naturally higher than the land bordering on Beachmont Avenue, and on the line of which a bridge over the railroad would be less expensive than on Beachmont Avenue. So, also, it has been suggested that Bennington Street, on the west side of the Boston, Revere Beach & Lynn Railroad, might be extended so as to cross that railroad, at or about a point where Elm Street extended would strike the railroad, thus not only avoiding the proposed Butler Avenue grade crossing, but also avoiding the grade crossing on Saratoga Street, at the Winthrop Junction station.

This last plan would be very desirable for the people of Revere, and seems to the Board to be the best plan which has been proposed. Undoubtedly it will require a considerable expenditure, but it is worth a good deal to be able to avoid the necessity of two railroad crossings at grade.

If a grade crossing on Beachmont Avenue were authorized by the Board, it would cost the railroad company at least \$600 a year for

the care of the gates. This would be 6 per cent. on \$10,000, or 5 per cent. on \$12,000, so that the railroad could well afford to contribute a considerable sum toward the expense of avoiding this grade crossing. The Board has in the past (Report 1885, pp. 43, 44) advocated the passage of a law providing in such cases as this for a division of the cost of avoiding a grade crossing between the railroad company and the cities and towns benefited. The circumstances of this case confirm the Board in the opinion that such a law is desirable.

It is unfortunate and undoubtedly gravely dangerous that the people should be allowed to pass over Butler Avenue, as a private way, but that is a danger for which the Board is not responsible, and which it is not within its power to abate. If, however, it should sanction a grade crossing, such action would as years roll by become a greater and greater blot upon its record.

The Board therefore feels obliged to decline to give consent to a crossing of the tracks of the Boston, Winthrop & Shore Railroad by Beachmont Avenue at grade, as set forth in the resolve of the street commissioners of the city of Boston.

For the Board,

GEORGE G. CROCKER,

Chairman.

Nov. 22, 1887.

[E.]

STATION ACCOMMODATIONS.

PETITION OF CITIZENS OF SPRINGFIELD FOR BETTER
STATION ACCOMMODATIONS ON THE BOSTON &
ALBANY RAILROAD IN THAT CITY.

A large number of citizens of Springfield and others represent that the accommodations at the Boston & Albany passenger station in that city are insufficient for the proper transaction of the business there done, and dangerous to the lives of passengers and others, and that it is the practice of the New York, New Haven & Hartford Railroad and the Boston & Albany Railroad to stop cars and engines on Main Street to the great obstruction of travel and danger to those using the street, and they ask the Board for relief.

After due notice a public hearing was held at the court house in Springfield, January 31, at which many of the petitioners and others were present with counsel, and the railroad corporations were represented by counsel or officials. No remonstrants formally appeared, but it was stated by counsel that if a plan for a relocation of the station should be submitted remonstrances against it would be presented. No such plan, however, was submitted.

The testimony of a number of citizens was offered to show the inadequacy of the station for the business of the several roads, and the danger to life and limb arising from the present method of moving trains and engines in and through the station. Testimony was also submitted as to the obstruction of Main Street by the stopping of cars and engines on the crossing, and the great danger to life by the frequent switching of engines and cars over it.

As to the inadequacy of the station for the business there appears to be no difference of opinion, and from frequent observation the commissioners concur with the general testimony upon this matter. The station was built in 1851, since which time the population of Springfield has more than tripled, the thriving city of Holyoke has

grown up, and all the surrounding territory which contributes to the business of the station has very largely increased in population and in various and extensive industries. Although the accommodations have been from time to time improved, the improvements have by no means kept pace with the increasing business of the several roads, and to-day the station is far from being worthy, either of the prosperous railroad corporations using it, or of the enterprising city in which it is located.

For the relief of the public from the inconveniences and dangers complained of, several changes in the station and in the manner of moving trains and engines in and through it are suggested, as follows:—

1. A substantial fence should extend longitudinally through the station, on each platform, and from the station to Main Street, with proper gateways for the entrance or exit of passengers to or from the cars, and for the transfer of baggage from one side of the station to the other; and the gates should be kept closed at all times except when a train is receiving or discharging passengers, so that no one be permitted to cross the tracks. And an overhead or underground passage-way should be provided for passengers or others having occasion to pass from one side of the station to the other. While such fences would diminish the already limited space allowed to the public, the increased safety secured would compensate for the inconvenience which might be suffered.

2. The sheds at the west end of the station, alongside the tracks of the northern and southern roads, should be so constructed as to afford better protection from the weather, when all the cars of a train cannot be brought under the roof of the station. And the platforms both in the station-house and under the sheds should be kept clear of baggage trucks and vans except when in actual use.

3. Trains coming into the station from the west, including those of the northern and southern roads, should be stopped before the engine reaches Main Street, and the engine be switched back without crossing the street. If the train is to proceed eastward, the engine which is to haul it should also be switched into position to connect with the train without crossing Main Street. Trains entering from the east should not come to a full stop until the entire train has crossed the street.

4. The Boston & Albany Railroad Company should store its passenger cars west of Main Street, so that the numerous crossings of that street required by switching those cars to and from the station may be avoided. Even if it were found necessary to store them at West Springfield it would not be much further away than some of the railroads in Boston are obliged to house their cars.

5. No switching of freight trains across Main Street should be allowed unless absolutely unavoidable, and no freight train should pass through the station while a passenger train is receiving or discharging passengers.

6. Main Street crossing should be better guarded against accident. While the above-named suggestions, if carried out, would reduce to a considerable extent the number of trains and engines crossing the street, the public should still have all the additional protection possible on a thoroughfare of such importance; and substantial gates should be placed there similar to those at the Causeway Street crossing in Boston, so that no person could get over, under or around them, and the reckless as well as the unwary would be protected.

The above suggestions, if adopted, would afford relief from the inconveniences and dangers complained of, so far as seems possible in the present station, and the Board recommends to the Boston & Albany Railroad Company that they carry them into effect at the earliest practicable date, with such practical details as the managers are best qualified to devise.

It was argued by counsel that the petition asked only for such relief as could be given in the present station, and acting on that view of the case the Board makes the foregoing recommendations. But while the proposed changes in the station and in the method of moving cars and engines will afford partial relief, the Board under its general advisory powers deems it proper to take a broader view of the subject. Section 16 of chapter 112, Public Statutes, is as follows:—

The Board, whenever it deems that repairs are necessary upon any railroad, or that an addition to its rolling stock, or an addition to or change of its stations or station-houses, or a change in its rates of fares for transporting freight or passengers or in the mode of operating its road and conducting its business, is reasonable and expedient in order to promote the security, convenience and accommodation of the public, shall in writing inform the corporation of the improvements and changes which it considers to be proper; and a report of the proceedings shall be included in the annual report of the Board.

Action under this section is not necessarily based on a petition, but the Board on its own motion may consider what change of stations or station houses is reasonable and expedient in order to promote the security, convenience and accommodation of the public. And the Board in its suggestions or recommendations to this end has always exercised a wide discretion.

During the whole period of the Board's existence the condition of the station at Springfield, and the manner of operating that portion

of the Boston & Albany road, have been the subject of more or less complaint, and have come under the observation of the commissioners. In 1869, the year in which the Board was established, an act was passed authorizing the Boston & Albany Railroad Company to change the location of its passenger station in Springfield, and to change the grade of its railroad there so as to pass over or under Main Street. From that time to the present the changes contemplated under that act have frequently attracted the attention of the commissioners, and they are not unfamiliar with the subject. They believe that the station should be located east of Main Street, where there is ample room for accommodations that shall meet the wants of the railroads and the public for an indefinite future. The growth of the city will be largely in this direction, and the station would become more central and accessible than the present location. It is not necessary to inquire why no action has ever been taken under the act of 1869. But in view of the continued complaint, more or less pronounced, for eighteen years, as to the inconvenience and inadequacy of the present station, and the annoyance and danger incident to its location, the Board is of opinion that action under the law, or under further legislation if necessary, or even under the general law, should no longer be delayed.

The removal of a long established station from a locality of which it is a most important part, must always meet with some opposition, and of course will be an inconvenience or possible injury to some individuals. But the fearful anticipations of interested parties in such cases are often exaggerated and are seldom realized. And if such considerations are to prevail the march of improvement will be slow indeed. The change now suggested, however, it is believed would not cause serious inconveniences or loss to any considerable number, while to the city as a whole it would be a certain and great benefit. The location of the station east of Main Street would very largely increase the value of real estate in that section, and the erection of such a building as the good taste of the Boston & Albany Company is likely to select would add to the attractions of the locality and promote further improvements for the advantage of the city. It is to be remembered that a movement of this kind is not for the present alone, but for the future also; and in making it now the probabilities and possibilities of the future should be considered when Springfield, with its 100,000 people, shall be, even more than now, the metropolis of Western Massachusetts.

Should the change involve a separation of grades of the railroad and Main Street, as authorized by the Act of 1869, or as may be authorized and required by proceedings under the general law, it is supposed that it may be accomplished without a very serious altera-

tion of the grade of the street or the erection of an unsightly structure over it, and that it would be no lasting injury to the real estate or business interests in that vicinity. Springfield is an enterprising and progressive city, and its Main Street is not to be permanently damaged because a railroad station is to be removed from it, or because it is no longer obstructed by trains on a level crossing.

If the change of location suggested should take precise form by action on the part of the Boston & Albany Railroad Company, any plans proposed must come before the proper tribunal, and remonstrants against their adoption can undoubtedly be heard.

By the Board,

WILLIAM A. CRAFTS,
Clerk.

FEB. 17, 1887.

IN THE MATTER OF THE COMPLAINT OF MRS. GEORGE S. WINSLOW AND OTHER LADIES OF NORWOOD THAT THE ACCOMMODATIONS AT NORWOOD CENTRAL STATION ON THE NEW YORK & NEW ENGLAND RAILROAD ARE INADEQUATE AND INCONVENIENT, ESPECIALLY FOR LADIES.

Hearing Friday, September 2, at Norwood.

The case for the complainants was very ably presented by one of the ladies. Her argument, and an examination of the station, satisfied the Board that the complaint was well-founded. The station is too small. It contains but one room, and lacks the conveniences which a station of its importance ought to have. The Board recommend that a much larger station be provided, with rooms and water closet accommodations for men and women respectively, with a room for baggage and parcels, and with a platform on the street side convenient for those coming in carriages. Since the hearing, plans have been submitted to the Board both by the complainants and by the company. The design offered by the ladies would involve unnecessary expense. The plan submitted by the company is unsatisfactory. Not only does the present passenger business demand better accommodations, but there is a good reason to believe that the business would have been larger had it not been for the forbidding character of this station.

A station furnishing the requisite accommodations can be built for

about \$2,000. In the opinion of the Board the expenditure of that sum is not only demanded in the interest of the public but will prove to be a judicious outlay for the company.

For the Board,

GEORGE G. CROCKER,
Chairman.

Oct. 24, 1887.

PETITION OF CITIZENS OF PALMER FOR BETTER ACCESS TO THE STATION OF THE BOSTON & ALBANY RAILROAD IN THAT TOWN.

In accordance with chapter 189 of the Acts of the year 1887 the Board gave a hearing to all persons in interest, at the station of the Boston & Albany Railroad, in Palmer, at 5 p. m., on Wednesday, Nov. 2, 1887, notice thereof having been duly published in "The Springfield Republican" and "Springfield Union," and posted in the town of Palmer. The meeting was duly adjourned to the district court-room. Some of the citizens of the town were represented by George D. Robinson, and others by Stephen S. Taft. The Boston & Albany Railroad Company was represented by its vice-president, J. A. Rumrill.

The citizens represented by Mr. Robinson desired that a tunnel should be built, starting at the northeast end of the station, running under the railroad diagonally and terminating on Main Street at the westerly side of Hatch's Block, so called, and they submitted drawings thereof, showing a tunnel 116 feet in length, 8 feet wide and 8 feet high in the centre, with 20 steps on the station end and 23 steps on the Main Street side, besides an inclined walk. The steps were to be seven by twelve, and the tunnel to be lighted by four patent sky-lights three feet square. They submitted an estimate placing the cost of construction at \$4,000.

Mr. Taft, representing other citizens, advocated a footway on the west side of the station, beginning at the westerly end of the platform and descending by steps to a point about four feet above the level of Commercial Street, where it passes under the railroad tracks, then turning at a right angle and running along the line of Commercial Street, at a level, until the grade of the footway and the grade of the street meet, and then on the regular sidewalk to Main Street. One man advocated an overhead bridge.

In behalf of those favoring the tunnel route it was claimed that the

act requires a new footway, either over or under the tracks of the railroad, all the way from the station to Main Street.

In behalf of the railroad it was claimed that the provisions of the act would be complied with by building a flight of steps from the westerly end of the platform down to Commercial Street, where it crosses under the tracks.

The Board is of the opinion that a reasonable interpretation of the statute lies between these two extremes, and that the words, "A footway or other additional approach to its station in the town of Palmer, for the accommodation of persons travelling on foot between said station and Main Street in said town," do not absolutely require that such new footway should extend the whole distance from the station to Main Street. If such had been the intention of the statute, the words, "A new footway from the station to Main Street," or words to that effect, would have been used. On the other hand, the Board is of the opinion that the act contemplates some additional method of getting over or under the tracks, or some improvement of existing methods. There are, therefore, three ways in which the provisions of the act can be complied with: First, the tunnel from the easterly end of the station to Main Street; second, the plan advocated by Mr. Taft as aforesaid, making use of a portion of the location of Commercial Street; and, third, an overhead bridge.

The proposed tunnel has many disadvantages. It would be about 116 feet long, and would, in the opinion of the Board, be a place through which women and children would dislike to travel even in the daytime. The petitioners estimated that the cost of such a tunnel would be \$4,000. The Boston & Albany Railroad Company estimates the cost at \$11,500, and the Board believes that the latter estimate is more nearly correct than the former. Moreover, if such a tunnel should be built the company would be at constant expense for lighting and keeping it clean and dry.

The Board has no way of knowing how great a burden the Legislature intended to impose upon the Boston & Albany Railroad in this matter, but as the company has just built at large expense an elegant station and extended platforms, and as there is access to the station on the east side by an overhead bridge opposite Church Street, and on the west by Commercial Street which passes under the tracks; and as the Board is not aware of any misdemeanors on the part of the road toward the town of Palmer which call for punishment, it does not seem to the Board that the Legislature could have contemplated, or that there is anything in the circumstances which would justify, an order requiring the railroad to furnish additional means of access to its station, at an expenditure so large as would be necessary in order to build the tunnel.

Coming next to the plan advocated by Mr. Taft, the Board believes that it is the best plan which has yet been suggested, and will prove on the whole the most convenient and desirable. By this route the distance from the corner of Commercial and Main Streets to the centre of the depot is 445 feet, or 70 feet less than the distance from the same corner to the same point by way of the tunnel, so that the Commercial Street route will be shorter for all persons coming from points west of Commercial Street.

From the post-office, as now located at the corner of Walnut and Main Streets, the distance by way of Commercial Street is about 200 feet more than by way of the tunnel, and for people coming down Central Street the distance by way of Commercial Street is about 380 feet more than by way of the tunnel.

For a portion, therefore, of the village in the town of Palmer the tunnel would be the shorter route to the station, but for the other three villages in the town, inasmuch as they lie west of Commercial Street, the Commercial Street route would be the shorter. The village around the station was said at the hearing to embrace about one-third of the population of the town, and it would be only a portion of that third which would find the tunnel route the shorter, while the remaining portion of this third, and the other two-thirds, would find the Commercial Street route shorter. This advantage in favor of the Commercial Street route is lessened by the fact that a great many people wish to stop at the post-office on the way to or from the cars, and for all such this Commercial Street route would, as has been stated, be 200 feet longer than the tunnel route. On the other hand, it is to be borne in mind that the location of the post-office is not unalterable, and would in fact probably be changed if the Commercial Street route were adopted.

The Commercial Street plan contemplates taking away the easterly abutment of the street, where it passes under the railroad track, and building a new abutment on the east side of the Commercial Street location, thus widening the passage under the tracks from about sixteen to thirty-two feet; this will give eight feet more for the drive-way, and an eight-foot walk. This sidewalk should be kept from three to four feet above the level of the drive-way, as it is unnecessary to have more than seven and one-half or eight feet head room, and should be carried on a level until it strikes the grade of Commercial Street. The descent to it from the platform would be easy. It would have many advantages over the proposed tunnel. It would be shorter,—not more than seventy-five feet in length. It would be very much lighter, inasmuch as it would get the full benefit of the road-way opening of twenty-four feet. Only one flight of steps would be necessary, whereas the proposed tunnel requires two, and

the opening from the station platform would give a side light of considerable value to the carriage-way.

As this plan contemplates the use of a portion of a county road, and an expenditure on the part of the county, the Board can make no order relating thereto, except subject to the assent of the county through its proper officers, and to an agreement as to the division of the cost.

The only alternative is an overhead bridge. As compared with the Commercial Street plan such a structure has obvious disadvantages. It is necessary to rise from the platform about twenty feet, whereas the descent on the Commercial Street plan would only be about ten feet. Such an overhead bridge would cost about \$2,500, and in the opinion of the Board would not be so well liked as the Commercial Street plan. That the position of this overhead bridge should be at the west end of the platform as shown on the plan is determined not only by the foregoing considerations concerning distances, but also by the fact that an overhead bridge at or near the location of the proposed tunnel would obstruct the view of the home signals for the New London Northern crossing, which signals could not with safety be placed so far from the crossing as the tunnel site.

The statute requires the Board of Railroad Commissioners to order and determine the location and manner of construction of the footway or other additional approach to the station. The desirability of an alternative order was evidently not contemplated, but the Board feels that the plan making use of Commercial Street would prove so much more convenient and would give so much better satisfaction, in the long run, that it feels justified in ordering that such plan shall be carried out as herein suggested, provided an agreement with proper officials of the county can be entered into before the first day of February next; and if such agreement cannot be made, then it orders the Boston & Albany Railroad to construct an overhead iron bridge, in accordance with plans on file in this office, the footway starting from a point near the westerly end of the platform, and ending on Commercial Street at a point about 138 feet from Main Street.

For the Board,

GEORGE G. CROCKER,
Chairman.

Nov. 21, 1887.

[F.]

PASSENGER AND FREIGHT FACILITIES.

CITIZENS OF HANOVER *v.* OLD COLONY RAILROAD COMPANY.

The selectmen of Hanover and other citizens ask the Board to recommend that the Old Colony Railroad Company shall so change its time-table as to allow the Hanover Branch Railroad to run a train from North Abington to Hanover and return, connecting with a train for Boston on the Old Colony road.

The train requested is a desirable one. The Board would be glad to see the wished-for facilities granted, and the managers of the Old Colony road concur in this desire. The Hanover Branch managers also concur in the wish. But it appears upon full consideration that the proposed change would cause far more inconvenience than it would cure. It is much easier to criticise a time-table than to make one. It is hardly necessary to say that one change in a complex time-table leads to others. In this case thirty changes would result from the alteration, and some of them would be exceedingly injurious to the interests of people in the Old Colony, including the interests of those who desire easy communication with the shire town of the county. One of the projects by which it was hoped to make the proposed change feasible received an instant protest from the selectmen, and some insuperable objection appeared to every scheme suggested. It is a case where a well-founded and honest desire is met by objections just as honest, and, as it appears to the Board, more weighty.

It has been suggested that increased accommodation on the Hanover Branch Railroad might accomplish the desired result. The counsel for the petitioners has properly answered this proposition by saying that this is not the request of his clients. And we add that it will be time to consider such a request when it is made, and when made both sides (and all sides) of the question will be considered. At present it is enough to say that the balance of considerations as to the public convenience forbid the granting of this petition.

For the Board,

THOMAS RUSSELL, *Chairman.*

TRAINS ON THE NANTASKET BEACH RAILROAD.

The selectmen and other citizens of Hull ask the Board of Railroad Commissioners to recommend that the management of the Nantasket Beach Railroad continue the running of trains through the winter season. The commissioners have been called upon twice before to use their recommendatory office to secure to the people of Hull reasonable facilities of transportation during the winter months, and have fully expressed their views in relation to the matter. (Fourteenth Annual Report, p. 145; Sixteenth Annual Report, p. 122.) A single quotation from the last of these reports expresses the views of the commissioners in the present case: —

The present holders of this property can so use it as to furnish reasonable accommodation to the public. While they choose to hold it for their own purposes and to operate it for part of the year in their own way, they ought to give the reasonable and moderate facilities which the community desire during the remainder of the year. When they cannot do this, or do not desire to do it, they should give up the franchise, relinquishing its benefits when they cease to bear its burdens.

In former reports the Board has recommended the use of a combination engine and car, as sufficient to furnish the accommodation required, and as more economical. Since the first recommendation of this method of transportation (four years ago), when it was alleged that such a car could not then be procured, there has been ample time to have obtained one for use when summer travel ceased; but the Board is informed that no steps have been taken to provide this economical means of transportation, which would furnish ample accommodation through a great part of the year.

The commissioners are aware of the difficulties attending the operation of a railroad like the Nantasket Beach road during the inclement season of the year; and for that reason have considered that a reasonable service by means of a coach or barge might properly take the place of trains during the stormy months. But such a conveyance, if substituted, should be run at convenient hours, and afford facilities for the residents of Hull to go from the town and return the same day. Nothing short of this is reasonable, and nothing less than this ought to be offered.

The Board therefore again recommends that the parties in possession of the Nantasket Beach Railroad either run a morning and an afternoon train each way daily (except Sunday) to connect with

trains on the Old Colony Railroad at convenient hours, or in lieu of such trains run a coach or barge between the same points twice a day each way, at hours which will accommodate the public.

By the Board,

WILLIAM A. CRAFTS, *Clerk*.

JAN. 26, 1887.

COMPLAINT OF WILLIAM McKENZIE AND OTHERS *v.*
THE OWNERS OF THE NANTASKET BEACH RAIL-
ROAD.

Hearings July 5 and 8. Joseph Bennett for complainant, and Robert M. Morse for respondent.

The complaint calls the attention of the Board to the fact that the parties now in control of the franchise and property of the Nantasket Beach Railroad “do persistently refuse to operate the same, thereby failing to grant that reasonable or proper accommodation . . . which it is believed they, as common carriers, are bound to furnish, or forever abandon their location and relinquish their charter,” and to the further fact that “during the past winter the claim has been made in behalf of this company that its road is a summer road, expressly for the use and benefit of summer residents and excursionists, who alone could make it profitable,” and the prayer is that relief may be granted by the speedy renewal of train accommodations.

Trains have not been run on this road since last fall. In excuse for the failure of the management to operate the road, evidence was submitted to show that the title of the property is vested in Arthur W. Moors, trustee, he having been the purchaser at the sale made under a power of sale contained in a mortgage of the premises, and holding the property as trustee for the owners of the bonds secured by such mortgage; that these bonds are distributed in small lots, and that the owners are scattered all over England, very few residing in this country; that the trustee has received from the bondholders no authority or means for raising money; that it would cost at least \$10,000 to put the road in condition in which it would be safe for operation; that negotiations have been pending for some time with the Old Colony Railroad, looking to a purchase or lease by that corporation; that the trustee hoped and expected that these negotiations would be completed, so that the road would be taken and operated this summer by the Old Colony; that, in fact, no agreement

between the parties has been arrived at, though it is believed that such an agreement will soon be made; and that it was impossible for the trustee to operate the road, not only because he has no funds or authority to raise funds, but also because certain parties holding executions against the road had given notice that if an attempt was made to operate the road they should apply for an injunction in accordance with the provisions of the statutes in such case provided.

A railroad corporation is vested with great powers and privileges which are peculiar to such corporations, and the grant of which imposes upon the corporation special duties, among which the most important and undoubted duty is the duty to transport persons and freight at reasonable and proper times and rates.

Railroad companies are chartered as common carriers, and they are bound to perform the duties of carriers. In the case of this railroad the property is not now held by a corporation, but is held by an individual as trustee for certain bondholders. This, however, does not affect the rights of the public or the duties of the management of the corporation.

Section 1 of chapter 142 of the Acts of the year 1886 is as follows:—

A purchaser of a railroad at a sale under a valid foreclosure of a legal mortgage thereof, and his grantee and successors in title, shall be subject to all and the same duties, liabilities, restrictions and other provisions respecting such railroad or arising from the construction, maintenance and operation thereof, and have all the same powers and rights relating to said railroad and the construction, maintenance and operation thereof, which the corporation by which said mortgage was made was subject to, and had at the time of said sale.

The powers, therefore, and the duties of the present owners of this franchise and property are the same as the powers and duties of the original corporation. If the owners of the bonds have failed to furnish the person holding the title as trustee for them with sufficient means or authority to perform those duties and reap the benefit of those powers and privileges, the trustee may personally be free from blame, and yet the right of the public to be served by this common carrier cannot in any way be diminished thereby. In this connection it should be noted that the last report of the trustee to this Board shows a balance (surplus), Sept. 30, 1886, of \$11,815.95. Unreasonable failure to operate a road is good ground for the forfeiture of its charter.

Nor is the failure to operate this road excusable on the ground that should the management attempt to operate it, the court, upon application of the holders of executions against the road, would

probably by injunction restrain its operation until the executions are satisfied. It is the duty of the management of the road, as well as the duty of an individual, to pay just debts, and the legal consequences of a failure to perform this duty cannot be received as an excuse for neglecting to perform other duties.

When the hearings on this complaint closed, the hope was expressed that some arrangement might be made under which the Old Colony would operate the road for the present season, and with the assent of the counsel for the complainants, action by the Board was delayed until the result of pending negotiations could be learned. On the 17th of August the Board received a communication from the counsel for the complainants withdrawing his assent to further delay. While it is true that the necessary repairs of the road could hardly be finished before the end of the season, it is also true that the management has been negligent in suffering the road to get into its present condition.

The Board, therefore, adjudges that it is the duty of the owners of the Nantasket Beach Railroad to operate the road, and that the difficulties which they have pleaded do not relieve them therefrom.

For the Board,

GEORGE G. CROCKER, *Chairman*.

AUG. 20, 1887.

PETITION OF CITIZENS OF WEST SPRINGFIELD FOR AN EARLY MORNING TRAIN TO SPRINGFIELD.

Luke Bliss and more than twenty other voters of West Springfield petition the selectmen of that town to apply to the Board of Railroad Commissioners for a recommendation in favor of a passenger train to be run daily except on Sundays not later than 6.45 A.M. from West Springfield to Springfield. Like requests have heretofore been made to the Boston & Albany Railroad Company.

A preliminary question arises from the fact that no action was taken on this petition by the selectmen, who are said to have required a second petition — for what purpose we are not informed. The law says that in such case the selectmen shall indorse on the petition the reason of their non-compliance. But it cannot be supposed that by neglecting to do this the selectmen can deprive the commissioners of their modest jurisdiction, which is limited to a recommendation. In other words, the selectmen by neglecting to do their duty cannot prevent the commissioners from doing theirs.

The strength of this petition lies in the fact that more than fifty men and women (not including railroad operatives) are believed to do their daily work in Springfield, while they live in West Springfield, with the advantages of fresh air, cheap land, and in general, of the benefits of a residence in the country. It is believed that the number availing themselves of these advantages would increase if proper facilities were furnished by which men and women could without undue expense leave their homes in West Springfield for the places where they work in Springfield.

The principle upon which this accommodation is sought is that upon which so-called working-men's trains are run to and from Boston under the provision of section 183, chapter 112, Public Statutes. The accommodation that would be afforded would be of great value to the people. The cost would be small. We have preferred not to indicate the best and most economical methods by which this service could be rendered, nor to set forth details of the arrangements proper to be made. But the Board adjudges that the complaint is well founded, and in order to promote the convenience and accommodation of the public, the Board thinks it proper and desirable to run a passenger train at reasonable rates daily, except Sundays, from that part of West Springfield called Mittineague to a point or points in Springfield suited for the accommodation of men and women working in that city.

For the Board,

THOMAS RUSSELL, *Chairman.*

* JAN. 8, 1887.

R. A. FOREST AND OTHERS *v.* THE HANOVER BRANCH RAILROAD COMPANY.

A large number of the citizens of Rockland ask the Board to recommend that the Hanover Branch Railroad Company furnish a train, to connect at North Abington with the train on the Old Colony Railroad, which leaves Brockton at 5.30 p. m., to carry home many workingmen who return from Brockton, Whitman and Abington. In the morning a train on the Hanover Branch connects with the Old Colony train to Brockton, and tickets are sold at reduced rates to many persons who work daily at Brockton and other places. But when the afternoon train on the Old Colony road brings them back to North Abington, they are obliged to wait an hour for a train on the Hanover Branch, or take a coach or some other conveyance to their homes.

The delay of an hour at this time, after a day's work, is a serious inconvenience to these parties, and the president of the Hanover Branch Railroad Company admits that the request of the petitioners is just and reasonable, but pleads inability to furnish the train. Upon a full consideration of the case the Board cannot admit this plea. The Hanover Branch Railroad Company is not a poor corporation, without means to provide the equipment which its business demands, and the road is capable of being operated so as to furnish the accommodation now asked for without diminishing the facilities already afforded. The Board, therefore, recommends that the Hanover Branch Railroad Company furnish the accommodation asked for, and run a train from North Abington upon the arrival of the 5.30 Old Colony train from Brockton.

By the Board,

WILLIAM A. CRAFTS, *Clerk*.

FEB. 5, 1887.

HON. GEORGE S. BOUTWELL AND OTHERS COMPLAINANTS *v.* THE WORCESTER, NASHUA & ROCHESTER RAILROAD.

Hearing August 1, 1887. For complainant, George S. Boutwell; for respondent, Solomon Lincoln.

The complaint alleges that since the Worcester, Nashua & Rochester Railroad was leased to the Boston & Maine Railroad the rate for quarterly season tickets between Groton and Ayer Junction has been unreasonably raised, and that the yearly and half yearly season tickets, which were formerly sold at a rate much lower than the quarterly tickets, have been discontinued.

The distance from Groton to Ayer Junction is 3.52 miles. Before the Worcester, Nashua & Rochester Railroad was leased to the Boston & Maine Railroad, three months, six months and yearly tickets were issued. But after the lease, the six months and yearly tickets were discontinued, and the price of the three months tickets was raised from \$9 to \$11. Formerly a yearly ticket cost \$25, — now four quarterly tickets would cost \$44.

It appeared that the charge now made is in conformity with a general system adopted by the Boston & Maine Railroad on its main line, and the roads operated by it, that when this system was applied to the Worcester, Nashua & Rochester Railroad on January 1, 1887, it resulted in a few cases in an increase of rates, but

generally in a decrease of rates upon the various classes of tickets now in use.

There are only about half a dozen season ticket holders from Groton to Ayer Junction. There was no evidence to show that the case of Groton and Ayer Junction involved any elements which justified its being excepted from the general system adopted by the road, and in the absence of any proof that that system was unreasonable or unjust the Board make no recommendation that the rates should be changed.

By the Board,

GEORGE G. CROCKER,

Chairman.

AUG. 22, 1887.

COMPLAINT OF CLARENCE HAYWARD *v.* THE BOSTON & ALBANY RAILROAD.

Hearing Oct. 10, 1887.

The complainant alleged that, having a mileage ticket on the Boston & Albany Railroad and also on the Connecticut River Railroad, he went to the Boston & Albany station in Boston and asked to have a trunk checked for Holyoke on the Connecticut River Railroad; that the baggage master refused to do so, and that he, the complainant, was put to the trouble of having his trunk rechecked at Springfield, in consequence of which he lost close connection at that point and was obliged to lie over until the next train. The answer of the Boston & Albany Railroad was that it did not issue the mileage ticket for the Connecticut River Railroad, and therefore, with reference to it, was not acting as agent for that company, as it would have been had it sold a trip ticket from Boston to Holyoke.

It is evident that it would be for the convenience of passengers holding mileage tickets, if they could check their trunks through on connecting lines. In some respects, moreover, it would be equally, possibly more convenient for the railroads, if they should by mutual agreement act as agents for each other with reference to mileage tickets, in the same manner as in the case of trip tickets. An agreement might be made by which the baggage master receiving the baggage should cancel with his baggage punch the proper number of mileage coupons, or detach the proper number of special baggage coupons on the mileage ticket of the connecting road, as well as on the ticket of his own road. At the transfer point the initial road would then be saved the trouble of delivering up the trunk to the owner, and the connecting road would be saved the trouble of re-checking it to its destination. The saving would, however, be of

considerable importance only when the same baggage car runs through from the starting to the destination point. In some such cases the Board is informed that baggage is now checked through on mileage tickets. In the case under consideration there was no through baggage car, and it was necessary in any event to transfer the baggage at Springfield from the cars of the Boston & Albany to the cars of the Connecticut River Railroad.

As no agreement between the two roads now exists which would authorize the Boston & Albany to mutilate the mileage ticket of the Connecticut River, the question is, whether the Board shall recommend that a mutual agreement covering such cases shall be entered into between roads connecting as the Boston & Albany and Connecticut River do. In other words, shall the Board recommend that the original purpose and scope of the mileage ticket be still further enlarged? The Board knows of no basis for such a recommendation. Mileage tickets are issued at specially low rates, and no reason was suggested at the hearing, or has since been brought to the attention of the Board, why railroad companies should furnish on these tickets the same accommodations with respect to connecting roads as they furnish when they sell a ticket not limited to their own road, but good for the connecting roads as well. Moreover, there are practical difficulties in the way. In order to prevent mileage tickets from being used as a means of getting an excess of baggage carried, it is necessary either to have the proper number of baggage coupons detached when the baggage is checked, or else have the proper number of mileage coupons punched with a special baggage punch. This throws upon the baggage master, for every mileage ticket presented, a considerable amount of labor, — much greater than that of punching a single trip ticket, — and this work on the roads where mileage tickets are in use has already grown to serious proportions, rendering it difficult to manage the proper checking of baggage in the short time allowed therefor by the passengers. This work would be largely increased, and might well prove a serious interference, if baggage masters were obliged to take care, not only of the mileage tickets on their own road, but also the mileage tickets on one or more connecting roads, with the distances on which they would be less familiar.

It is, moreover, obvious that a looseness in the matter of punching or detaching coupons from mileage tickets would be likely to grow up at small stations where the station agent has other duties to perform.

The Board, therefore, declines to make the recommendation petitioned for.

For the Board,

GEORGE G. CROCKER, *Chairman.*

IN THE MATTER OF THE COMPLAINT OF W. R. GUILD
AND OTHERS *v.* THE NEW YORK & NEW ENGLAND
RAILROAD.

Hearing December 6, 1887.

For petitioners, S. W. Hatheway and John L. Wakefield of Dedham, John C. Lane of Norwood, J. J. Fealey of Walpole, George W. Wiggin of Franklin and Robert W. Carpenter of Foxborough.

For respondent corporation, Vice-President William P. Shinn and R. M. Saltonstall.

The petition, which is numerously signed, sets forth that the New York & New England Railroad Company is entitled to a right of way, formerly a part of the Norfolk County Railroad, extending from the main line of the railroad at Islington Station to Dedham Village, originally acquired by the right of eminent domain, and that formerly passenger trains were run regularly over such right of way, but several years ago were discontinued; also that passenger trains were at one time run regularly from a point on the New York & New England Railroad called Dedham Junction to Dedham, and that such trains have also been discontinued.

The complaint further states that it is important and that public convenience and necessity require that the people of Norfolk County residing on the line of the New York & New England Railroad should be furnished with convenient means of access to Dedham Village, where are situated the county buildings, the courts, the registries of probate and insolvency and of deeds, banks, insurance companies, etc., and the complainants ask that said corporation be required to run passenger cars from Islington to Dedham over said right of way, or over the road from Dedham Junction to Dedham.

In 1846 a charter was granted to the Walpole Railroad Company to construct and maintain a railroad from Dedham to Walpole. This line was subsequently consolidated with the Norfolk County Railroad, forming a continuous line from Dedham to Blackstone. About the year 1866 the operation of the portion between Islington and Dedham was discontinued. Subsequently this portion was again operated for several years by the New York & New England Railroad, but it proved unprofitable and the tracks were taken up. In the location of the New York & New England Railroad filed in 1881 it is laid down as the "Dedham Branch."

There was conflicting testimony as to whether this Dedham Branch could now be run with profit. It seems probable that it would not pay expenses for some time at least; but it does not follow that the New York & New England Railroad is thereby relieved from the duty of operating it.

It was stated at the hearing, and not denied, that one of the

principal reasons urged for granting a charter for the Walpole Railroad was, that it would furnish access to Dedham, the shire town of the county.

The grant of the franchise gave privileges and imposed burdens. The Board is not justified in assuming that the Legislature intended to allow the holders of the charter to avail themselves of the benefits attaching to one portion of the road and to decline the burdens attaching to another. The case of *The Commonwealth v. The Fitchburg Railroad*, 12 Gray, 180, cited by the counsel for the respondent corporation, is not parallel. In that case the Fitchburg Railroad maintained a branch in good condition for use, used it regularly and sufficiently for the transportation of freight, and held itself in readiness to carry passengers whenever any requested to be carried, at reasonable rates. On this Dedham Branch, however, the rails have been taken up. Moreover, in the case of the Fitchburg Railroad the Commonwealth had granted a franchise to another corporation and such grant had spoiled the value of its previous grant to the Fitchburg Railroad, so far as the branch in question was concerned. In the present case the New York & New England Railroad cannot plead that the grant of a location for a railroad from Islington to Readville has interfered with the value of its location from Islington to Dedham, because the location from Islington to Readville is not the property of a competing corporation, but is its own property. Duties growing out of a first gift cannot be diminished by a second gift of a greater value.

The loss, if any, in operating this branch would be small. It cannot be claimed that the resources of the road would thereby be exhausted, so that it would be rendered incapable of discharging its other duties.

The Board therefore adjudges that it is the duty of the New York & New England Railroad to put the branch from Islington to Dedham in suitable condition and operate the same.

The branch from Dedham Junction to Dedham was in 1881 opened for public use in accordance with a certificate issued by this Board under Public Statutes, chapter 112, section 141. No special act of Legislature was at that time needed. The facts in relation to this branch were not sufficiently developed at the hearing to justify an opinion as to whether it is the duty of the New York & New England Railroad to renew its operation. It is unnecessary for the Board to pass upon this question at the present time, as the complainants only ask that either one route or the other may be operated.

For the Board,

GEORGE G. CROCKER, *Chairman*.

[G.]

EXIGENCY FOR NEW ROADS.

PETITION OF THE EAST WAREHAM & ONSET BAY RAILROAD COMPANY FOR A CERTIFICATE OF EXIGENCY.

Hearings October 10 and 12. For petitioners, E. B. Powers ; for remonstrants, Alfred Hemenway.

It appeared that the requirements of law preliminary to an application for a certificate of exigency had been complied with, and that the application to the Board of Railroad Commissioners for such certificate had been made within thirty days after the first publication of the articles of association in accordance with section 37 of chapter 112 of the Public Statutes.

The termini of the road are a point at or near the intersection of the Old Colony Railroad and the highway near the station of said railroad at East Wareham, and a point at or near the intersection of Wareham Avenue and Onset Avenue, at Onset in Wareham. The length of the proposed road is about $1\frac{16}{105}$ miles, being wholly in the town of Wareham. The detailed estimate of the cost of construction made by E. L. Brown, civil engineer, and submitted to the Board was \$8,877.78.

On the petition of the Onset Bay Grove Railroad Association this Board on Sept. 25, 1885, issued a certificate of exigency for a railroad between Onset station on the Old Colony Railroad and the Onset Bay Grove. By chapter 285 of the Acts of 1886 the Onset Street Railway Company was chartered, and this railway has acquired the tracks of the Onset Bay Grove Railroad Company, so that, although the cars are propelled by a steam motor, these tracks are now used as a street railway, and not as a railroad within the meaning of the statute. This street railway company therefore takes the place of the railroad company, the exigency of which was confirmed by this Board.

The distance from East Wareham station on the Old Colony Railroad to the terminus of the proposed railroad on Onset Avenue is, as has been stated, about one and one-sixth miles, while Onset station, from which the existing railway runs, is about one and one-half miles beyond East Wareham, and the distance from it to the terminus of

the existing railway, near said Onset Avenue, is about one mile. The evidence showed that about seven-eighths of the travel to the grove comes from the direction of Boston, and it was urged as one of the reasons for the exigency of a railroad from East Wareham, that passengers taking it would save nearly a mile and a half travel over those going to Onset station and taking the street railway there.

Strenuous efforts have been made during the past summer to divert travel from the railway by inducing passengers to get off at East Wareham and take the barges from that point, and the proprietor of the barges testified that the number of passengers carried by him from April 1 to October 1 of the present year was 6,452, an average of thirty-five passengers per diem—or, as he made at least four round trips or eight single trips a day, an average per trip of four or five passengers. He also testified that he had carried one hundred tons of coal and several carloads of lumber and miscellaneous freight. Such a passenger and freight business would, of course, be utterly inadequate to support a steam railroad. On the other hand, it appeared that the street railway company has carried 30,000 passengers during the past year between Onset station and the grove, and, by economical management, has been able to divide six per cent. to its stockholders. This railway owns six cars and two motors, each of which motors accommodates about as many passengers as an ordinary horse car.

On special Sundays during the year it appeared that the railway and the barges were unable to accommodate promptly all those desiring to go to the grove, and that on such days several hundred people have been known to walk into the grove, rather than wait for a return trip of the cars or barges. This was especially urged in proof of the exigency for a railroad. Evidence was submitted to show that on certain of these special Sundays as many as 5,000 people had visited the grove. If 2,000 of these either walked or rode in carriages, it would leave 3,000 to go in the cars and barges, making 6,000 fares on both lines, or about one-sixth of the total fares collected for the six months from April 1 to October 1. The exigency of a railroad permanent all the year round cannot be rested upon any such spasmodic rush of patronage. Expenses go on accumulating every day in the week, whether it is pleasant or stormy, and whether there are or are not special attractions. The experience of the Nantasket Beach Railroad Company in this connection is peculiarly instructive.

It is at least evident from the testimony that both the railway and the railroad could not be supported by the present business nor by any business which is likely to arise for many years to come. If a railroad is established, running from East Wareham, in competition

with the railway from Onset station, it is probable that neither of them would pay expenses, and in a short time, one at least, and possibly both of them, would be financially ruined. In such case the people, instead of having a railway to the grove as they now have, would not have any railway at all. The distance from the line of the Old Colony is only one mile. That distance can be accomplished by a barge almost as quickly as by a railroad train, and the barge can, moreover, take the passengers to any portion of the grove which they desire to reach. The saving of time secured by the use of steam is, therefore, in this case not of material importance. The number of residents at the grove in the winter is about 200, and from October 1 to April 1 the barges collect between ten and twenty fares on the average per diem, that is, five or ten people travel over the road to East Wareham and back each day.

The Board adjudges that the public necessity and convenience does not require the construction of a railroad from East Wareham to Onset Bay Grove, as set forth in the petition.

For the Board,

GEORGE G. CROCKER, *Chairman*.

Oct. 15, 1887.

A certificate of exigency for an extension of a branch of the Boston, Winthrop & Shore Railroad in Winthrop, was granted March 15, 1887.

A certificate of exigency for a branch of the Old Colony Railroad from West Bridgewater to Easton was granted March 15, 1887.

[H.]

PASSENGER FACILITIES AND FARES.

GEORGE H. CARLETON *v.* BOSTON & MAINE RAILROAD.

The complaint of George H. Carleton sets forth that the Boston & Maine Railroad sells a ticket for one hundred rides between Haverhill and Boston, good either by the main line or by the Newburyport road, via Georgetown; that formerly it was the practice of the conductors to simply punch the coupon for a passage from Haverhill to Georgetown, leaving it in the possession of the passenger, who could use it on any train between Georgetown and Boston; but now the conductors are required to detach and take up the coupon for the partial passage, so that the passenger can show no evidence of his right to a passage on the connecting train from Georgetown to Boston, which is in charge of another conductor.

If this were the whole of the case it might be said that the complaint is well founded. But it appears from the statement made by the general manager of the Boston & Maine Railroad that tickets for a hundred rides between Georgetown and Boston are sold at the same rate as those for a hundred rides between Haverhill and Boston, and a passenger having one of the latter tickets could go from Boston to Georgetown, and if the coupon were not retained by the conductor could use it afterwards for a trip from Georgetown to Haverhill, or dispose of it to some other person, and thus deprive the road of its proper local fare between those places.

These tickets for a hundred rides are sold at a greatly reduced rate from the single ticket fare. The latter allows a stop over of ten days if desired, but in consideration of the greatly reduced rate at which the hundred ride ticket is sold, the company for its own convenience and protection limits the passenger to one continuous passage. And the Board is of opinion that the reasons submitted by the company for the rule now adopted are good and sufficient, and that it is intended for the reasonable protection of the company from a fraudulent use of the coupons, and imposes no real inconvenience upon the passenger; that in consideration of the reduced rates at which the tickets for a hundred rides are sold the company is justified in limit-

ing the use of the coupon to a continuous ride, without any right to stop over. And the commissioners can see no objection to the method adopted to secure such limitation.

By the Board,

WILLIAM A. CRAFTS,
Clerk.

FEB. 4, 1887.

GEORGE A. COBB AND OTHERS *v.* UNION STREET RAILWAY COMPANY OF NEW BEDFORD.

Hearing August 1 and 2, 1887. For complainant, Thomas F. Desmond; for respondent corporation, A. P. Smith.

The complaint is as follows:—

That under and by virtue of the provisions of an act to authorize certain street railway companies in New Bedford to lease, purchase or sell the rights and franchises of, and to unite and consolidate with each other, which act was passed March, 1887, the New Bedford & Fairhaven Street Railway Company and the Acushnet Street Railway Company, both of said New Bedford, did thereafter duly consolidate with each other under the name of the Union Street Railway Company, with Samuel C. Hart of New Bedford president; Andrew G. Pierce of New Bedford, treasurer; and a board of directors, as follows: Samuel C. Hart, W. W. Crapo, Charles E. Cook, Weston Howland, Abbott P. Smith, Andrew G. Pierce and Charles H. Gifford, all of New Bedford. And your complainants say, that they reside upon the route of such consolidated corporation, and that said corporation is not furnishing to the public sufficient travelling accommodations, and that said corporation makes an unjust discrimination in fares charged and established by the corporation for travel upon that section of the road operated on Acushnet Avenue from a point on said avenue, called the Nash road, north on said avenue, to the head of the river or Lund's Corner, in that said corporation charges five cents fare between all points in New Bedford and said Nash road, whereas said corporation charges ten cents fare between all points north of said Nash road and New Bedford; the distance from said Nash road to the head of the river being about 6,028 feet, whereas from said Nash road the distance which, at fare established at five cents, may be travelled southerly on said street railway, is three miles or more, wherefore your complainants pray that said corporation may be ordered to furnish such additional accommodations as, in the opinion of said board, the public travel requires, and that said Board shall revise and regulate the fares established by said consolidated corporation.

The power of the Board with relation to the matters covered by this petition is set forth in section 4 of chapter 91 of the Acts of the present year, being an act to authorize certain street railway com-

panies in New Bedford to lease, purchase or sell the rights and franchises of, and to unite and consolidate with each other. Said section reads as follows : —

Upon the complaint in writing of not less than ten persons residing upon the route of such consolidated corporation, that such corporation is not furnishing to the public sufficient travelling accommodations, the Board of Railroad Commissioners shall investigate such complaint, and may, after due notice and hearing, order such corporation to furnish such additional accommodations as, in the opinion of said Board, the public travel may require ; and said Board may, after due notice and hearing, revise and regulate the fares established by such consolidated corporation ; and all orders made by said Board under this section may be enforced in the manner provided in section 63 of chapter 113 of the Public Statutes.

The above section enlarges the powers vested in the Board by section 44 of chapter 113 of the Public Statutes. The authority of the Board is therefore ample to cover the prayer of the complainants. It appeared that the railway company make trips once an hour between Nash road and the head of the river or Lund's Corner in Acushnet. The evidence did not prove that the car on this portion of the road has been unduly crowded, or that in any way the travelling accommodations have been insufficient for those who desire to ride at the present rates. There was evidence to show that the cars have not been run strictly on schedule time, and that in this respect the management of the road has been negligent. The Board adjudges that the road, not only for the accommodation of the public, but also in its own interest, should exercise greater care in running its cars in accordance with schedule time.

The second portion of the complaint is, that the corporation makes unjust discrimination in fares, in that it charges ten cents for all passengers crossing the Nash road, in either direction. The distance from the centre of New Bedford to the Nash road is two and a quarter miles. The distance from the terminus of the road at the cove on the south to the centre of the city is less than two miles. In deciding whether there is any unjust discrimination, the centre of the city must be taken as a starting point, and it is not just to claim, that because a person can be carried for a five-cent fare from a point on one side of the centre of the city to a point on the other side of the centre, a distance of three or four miles, that he has a right to be carried at the same rate an equal distance away from the centre, in any given direction. Roads running long routes into the suburbs are justified in fixing a point beyond which an increase or double fare shall be paid. What that distance is, and what the increase of fare shall be, depends upon the circumstances of each particular case.

In the present case the Board is of the opinion that no unjust discrimination results from fixing the point at the Nash road. A portion of the public would be pleased and benefited by the abolition of the double fare, but whether such action could be taken with due regard to the interests of the railway company and its right to charge a sufficient sum to pay expenses and a reasonable profit, is an excessively complicated question. The Board feels that it has not received information sufficiently definite and extensive to justify it in passing any order in the premises. While, however, it refrains from making any order, the evidence which was submitted seems to the Board to raise a doubt whether the interest of the road as well as of the public would not be promoted by abolishing the double fare altogether, or substituting for it an eight-cent fare.

In most cases where a reduction is made the increase of business resulting therefrom fully realizes the expectation of the railway companies, and in this case the Board is of the opinion that there is a good chance that the road would not find itself a loser by the change. If the present double fare should be continued, or if an eight-cent fare should be adopted for all passengers crossing the Nash road, the Board recommends that notice be posted in the cars calling attention of the passengers thereto.

For the Board,

GEORGE G. CROCKER,
Chairman.

AUG. 6, 1887.

D. L. WITHINGTON *v.* BOSTON & MAINE RAILROAD. MILEAGE TICKETS.

The hearing was given July 23, and the complaint read as follows:—

The undersigned respectfully represents that upon the twenty-seventh day of June last he purchased of the Boston & Maine Railroad Company a mileage ticket, so called, which ticket contained 1,000 coupons, and entitled the undersigned to travel as many miles on said railroad as were represented by coupons attached; that the aforesaid railroad refused to carry out its said contract with the undersigned and with numerous others who have purchased said tickets, and unlawfully and without right demands and has taken from the undersigned and many others, as a condition of riding on the Eastern Division of said road between Newburyport, a station on said division, and other stations on said division, a number of coupons in excess of the number of miles travelled, in particular between Boston and Newburyport, 40 coupons, the distance being 37.3 miles by the official schedule,

and between Salem and Newburyport, 23 coupons, the distance being 21 miles, and in numerous other instances demanding more coupons than the number of miles travelled. The undersigned respectfully represents that these acts of said corporation are in derogation of its said contract, and are an unjust discrimination against the citizens of said Newburyport and travellers to and from said place. Wherefore he prays that your honorable Board may examine into said matter, in accordance with the provisions of the statutes of this Commonwealth.

At the hearing it appeared that the Boston & Maine Railroad Company has issued mileage tickets for 1,000 miles, with various conditions printed thereon. The condition which relates to the matter covered by this complaint was at first in the following form:—

That one coupon shall be detached by conductor for each mile travelled, except that for distances less than three miles three coupons shall be surrendered, and that all fractions of a mile shall be computed a mile in calculating distance travelled.

After about 1,000 of these tickets had been issued the condition was altered to read as follows:—

That one coupon shall be detached by conductor for each mile travelled in accordance with mileage table dated June 1, 1887, except that for distances less than three miles three coupons shall be surrendered, and that all fractions of a mile shall be computed a mile in calculating distance travelled.

It appeared that the mileage table dated June 1, 1887, and in accordance with which the coupons have been detached by the company from mileage tickets in each of the forms above specified, does not in all cases state the actual distances. For instance, the distance to Newburyport over the Eastern Division is stated as forty miles, whereas, in fact, it is but thirty-seven miles and a fraction, and the distance to Portland is stated as 115 miles, which is the distance to Portland by the Western Division, whereas the actual distance by the Eastern Division is only 108 miles and a fraction. In other words, the company has attempted to equalize mileage to points reached by its Eastern and Western Divisions by forcing the distances on the shorter line up, so that they will correspond with the distances on the longer line; and this attempt has resulted, in several instances, in a material increase of mileage as fixed by the mileage table over the actual mileage.

The mileage table thus prepared by the road is not a correct and true, but is an arbitrary, table. It is clear that those who bought the mileage tickets originally issued are entitled to have only such coupons detached therefrom as will cover the distance actually trav-

elled by them. Moreover, under the new form, in which the phrase "in accordance with mileage table dated June 1, 1887," is used, the public has a right to assume that that mileage table is an honest statement of actual distances, and that it is not a table in which the distances are arbitrarily increased.

The Board, therefore, adjudges that it is the duty of the road, with reference to both classes of tickets heretofore issued, to detach only such coupons as will cover the actual distance travelled, except that three coupons shall be surrendered for distances less than three miles, and that fractions of a mile be considered as a mile, as set forth in the printed conditions.

For the Board,

GEORGE G. CROCKER,

Chairman.

AUG. 10, 1887.

EUGENE H. CLAPP *v.* THE BOSTON & ALBANY RAILROAD.

Hearing Oct. 8, 1887.

The complainant in this case bought a ticket for Boston in Rochester, N. Y. Shortly after leaving Albany the conductor on the Boston & Albany road took up this ticket and offered an exchange check in its place. This the complainant refused to take, and demanded his ticket back again. The complainant did not examine the exchange check which was offered him, believing as a matter of right that a person who buys and receives a ticket cannot legally be compelled to give up his evidence of the contract entered into between him and the company, and receive another contract in its place, whether such other contract is actually of the same purport or not.

It appeared that it is a rule of the Boston & Albany Railroad that all tickets issued by other corporations, whether limited or unlimited, shall be taken up by its conductors when the passenger arrives on its road, and that exchange checks shall be given in place thereof, and it was shown that unless some such method was adopted the company would have no evidence that it had carried the passenger at all, — no evidence which would enable it to collect from the road issuing the ticket its share of the purchase money, — in case the passenger for any reason should leave the train before reaching his destination. It is proper that a railroad company should be protected from such a possibility. Careful management, indeed, requires it.

On the other hand, there seems to be good ground for the position taken by the complainant in this case, that having received an agree-

ment from a railroad corporation for transportation to a given point, he is not bound to give up that agreement and accept a substitute therefor, unless it is so provided in the original contract. As, however, the Board is not aware that any injustice has resulted from the present practice, and as the complainant would have suffered no loss had he accepted the check which was offered to him, and inasmuch as the National Association of the General Passenger and Ticket Agents of the Railroads in the United States has lately taken action looking to a change in the form of tickets, so as to secure uniformity on all roads, the Board simply recommends that whenever for good reason it is desirable that a ticket should at any point on the route be exchanged for another passage ticket or check, special provision therefor should be made on the ticket originally issued.

For the Board,

GEORGE G. CROCKER,

Chairman.

Nov. 15, 1887.

[I.]

IN THE MATTER OF THE PETITION OF THE WEST
END STREET RAILWAY COMPANY FOR AN INCREASE
OF CAPITAL.

Hearings August 19, 20, 22 and 24. Stevens, commissioner, did not sit. For petitioners, Hyde, Dickinson and Howe; for remonstrants, Augustus Russ.

The petition is as follows:—

To the Honorable Board of Railroad Commissioners:—

The directors of the West End Street Railway Company respectfully represent:—

1. That in and by the articles of association of said company its capital stock was fixed at \$80,000, which sum has been paid in in cash.

2. That the stockholders of this company, at a special meeting duly called and held for the purpose on the ninth day of August current, did authorize your petitioners to petition your honorable Board for leave to increase the capital stock of the company from \$80,000 to \$1,200,000, for the purposes hereinafter stated, as will more fully appear by the vote passed at such stockholders' meeting, or by a duly attested copy thereof.

3. That for the purpose of paying the indebtedness of the company, incurred in the purchase of sundry parcels of land on Beacon Street in Boston, a portion of which was conveyed to the city of Boston for the widening of Beacon Street, as a consideration for, and in order to obtain the grant of a location for the double tracks of this company in said Beacon Street, the sum of \$200,000 is necessary.

4. That for the purpose of paying for the construction of an additional section of the bridge over the location of the Boston & Albany Railroad Company on Beacon Street, to be given to the city of Boston as a further consideration for the grant to this company of a location for its double tracks in said Beacon Street, the sum of \$25,000 is necessary.

5. That for the purpose of payment of the indebtedness of the company incurred, or agreed to be, for the construction of Beacon Street, Brookline, as relocated and widened, and in the procurement of the conveyance of certain lands to the town of Brookline, lying within the location of said streets as thus relocated and widened (such indebtedness having been contracted in order that Beacon Street should be made of sufficient width to

permit of laying double the tracks of this company), the sum of \$320,000 is necessary.

6. That for the purpose of building and equipping the railway of this company upon the locations already granted to it in Boston and in Brookline (being about eight miles of single track, with the necessary switches and turnouts), the sum of \$240,000 is necessary.

7. That for the purpose of acquiring lands, other than those referred to in section 3 hereof, on which to place stations, car houses, stables, shops, and other necessary buildings, and for the uses of the company, and to provide for the erection of suitable buildings thereon, and for filling and grading such lands, the sum of \$405,000 is necessary.

8. That for the purpose of payment of legal expenses, which have been incurred by the company, the sum of \$10,000 is necessary.

Wherefore your petitioners pray that said West End Street Railway Company may be authorized to increase its capital stock for the aforesaid purposes by the amount of \$1,120,000, so that its entire authorized capital stock shall be \$1,200,000.

At the hearing it appeared, as stated in the first and second clauses of the petition, that the capital stock was fixed by the articles of association at \$80,000; that this sum has been paid in cash to the treasurer, and that the directors of said railway company have been duly authorized by the stockholders to petition this Board for leave to increase the capital stock of the company from \$80,000 to \$1,200,000 for the purposes set forth in the petition.

The prayer of the eighth clause of the petition was withdrawn by the counsel for the petitioners.

In behalf of the remonstrants it was claimed that the statutes, as amended by chapter 366 of the Acts of the present year, do not authorize an increase of capital for the purposes set forth in the petition. The argument, in brief, was, that section 15 of chapter 113 of the Public Statutes, before amendment, authorized the Board to allow "such necessary increase as it may see fit to an amount not exceeding the value of the property of the company," and that under it the Board could allow any increase which it deemed necessary for the proper conduct of the affairs of the corporation; whereas the amended statute of the present year defines the purposes for which an increase of capital may be authorized as follows: "For the purpose of building and equipping a branch or extension of its road upon a location duly granted or extended, as provided by law, or for other necessary and lawful purposes, set forth in the petition." It was claimed that this alteration was an intentional limitation of the power to increase capital stock, that the words "or for other necessary and lawful purposes" cover only extraordinary expenditures, necessitated by some unforeseen occurrence, and that this company, having started with a capital stock of \$80,000, being \$10,000 per

mile of the proposed road, is now estopped from legally claiming an increase of capital for the purpose of building and equipping said eight miles of its road, although its original capital is unquestionably insufficient for the purpose and that it can only be authorized to increase its capital for the purpose of building branches or extensions, or to meet expenditures rendered necessary by some extraordinary emergency. The Board does not take this view of the meaning of the statute as amended.

The primary object of the passage of the act of the present year was to amend the clause limiting "the increase of capital to an amount not exceeding the value of the property," by adding the words, "including the cash to be paid in on such increase." Under the original statute a doubt had arisen whether a corporation could be authorized to increase its capital until it had in some way acquired the property which the new capital was to pay for, and to avoid this question railway companies have in several instances borrowed money to pay for property, and have then asked for an increase of capital to be used to pay off the debt incurred for the purchase. The amendment, which was adopted, makes it clear that an increase of capital can now be authorized to provide for contemplated purchases and expenditures. Inasmuch as the purpose of a request for authority to increase capital stock is frequently the building and equipping of a branch, or extension of a road, that purpose was specially set forth in the statute, but, in the opinion of the Board, the expression of that purpose does not, as claimed by the counsel for the remonstrants, limit the words "or for other necessary and lawful purposes set forth in the petition." In this respect the scope of the amended statute is as broad as before amendment. The Board, therefore, adjudges that it has authority to allow any increase of capital which it deems necessary for the proper construction and equipment of the railway, although no extension of the original location is now contemplated.

It appeared that the company's total locations already granted in Boston and Brookline, including proposed double track, switches and turnouts, are equivalent to about eleven miles of single track; that the company proposes to build at once about eight miles of single track, and that this track is to be constructed in a much more substantial manner than other railway tracks in this vicinity; that the rails are to be the English rail, weighing ninety-six pounds to the yard, that the actual contracts which have already been entered into by the company show that the construction as proposed will cost not less than \$20,000 per mile, and that such sum is a reasonable and proper expenditure therefor. Also, that a reasonable allowance for the equipment of said eight miles of track is \$10,000 per mile, mak-

ing in all \$30,000 per mile, or \$240,000 for the eight miles proposed to be built, as set forth in the sixth clause of the petition.

It further appeared that \$75,000 is a reasonable and proper allowance for the erection of stations, car houses, stables, shops and other necessary buildings for the uses of the company.

It further appeared that \$25,000 is a reasonable and proper expenditure for a tract of land containing about two acres, near the Chestnut Hill Reservoir, to be used for car houses and stables, when the railway is extended to that point.

Beyond the sum of \$75,000 for buildings and \$25,000 for land at the reservoir, making \$100,000 in all, the petitioners in the seventh clause ask for an increase of capital to the amount of \$295,000 for the purchase of a triangular lot on the north side of Beacon Street, at the forks of the road, between Beacon Street, as widened, and Brighton Avenue, containing 127,669 square feet.

Evidence was submitted that the price at which the company can purchase this lot from the West End Land Company, being its cost last year, with 6 per cent. interest added, is considerably below its present market value. While it was admitted that so large an expenditure for land would be unnecessary and unwarranted in connection simply with the eight miles of road contemplated to be built by the West End Street Railway Company, being \$35,000 per mile, it was urged that such expenditure is justifiable in view of the contemplated consolidations. This lot seems, however, to the Board not only unnecessarily large for stable and car house purposes, but moreover, there is an obvious objection to the construction of stables and car houses on the easterly portion of it. Under the statute of the present year, above cited, no increase of capital stock can be allowed, unless it appears to the Board that the proposed purpose is both lawful and consistent with the public interest. There is reason to fear that the erection of stables and car houses, with all their natural concomitants, on the front or easterly portion of this lot, situated as it is on elevated ground, in a most conspicuous position at the junction of Beacon Street, Commonwealth Avenue, and Brighton Avenue, will render the neighborhood less desirable for residences, will retard the growth of population and injure the value of property in the vicinity, and will seriously mar the attractiveness of the approach both to the grand boulevard now being constructed through Brookline to Chestnut Hill Reservoir, and to the other boulevard, which is to be 150 feet wide, leading to Chestnut Hill Reservoir by way of Brighton and Massachusetts Avenues. The rear portion, however, of this triangular lot, having a frontage both on Beacon Street and Brighton Avenue, containing 95,000 square feet and known as the Branan lot, seems to the Board ample for the requirements of the

road, and is the cheapest and the least conspicuous part of the lot. It was purchased by the West End Land Company on the 1st of November of last year for \$160,385.50, being \$1.50 per square foot, and as it can now be purchased at cost with 6 per cent. interest added, the Board deems that it is justifiable and consistent with the public interest to authorize an expenditure therefor of \$168,000.

For the purpose of paying the expense of filling the above described lot near the Chestnut Hill Reservoir the sum of \$8,500 is allowed.

The third and fourth clauses of the petition may be considered together.

It appeared that the West End Land Company is an unincorporated association, its property being held by three trustees, namely, Messrs. Henry M. Whitney, Grenville T. W. Braman and Henry D. Hyde; that this property comprises all of the common stock of the West End Street Railway Company, many tracts of land in Brookline, along the line of Beacon Street, and one or two parcels of land in Boston; that Mr. Henry M. Whitney was the originator of the plan to widen Beacon Street, and construct a street railway therein; that when the petition of the "Association for the Formation of the West End Street Railway Company" for a location on Beacon Street and other streets in the city of Boston was pending before the Board of Aldermen, he agreed that if the board would grant the location, as asked for, he would convey or cause to be conveyed, to the city of Boston, the land necessary for the widening of said street as then proposed, between the forks of the road and the line between Boston and Brookline, and would further construct an additional section of the bridge over the Boston & Albany Railroad on Beacon Street, to be given to the city of Boston; that said location was granted; that the details of the agreement were subsequently modified, owing to a change made in the width of the street; that the land necessary for the widening has been conveyed by him or by his procurement, to the city of Boston; that contracts for the construction of such section of bridge have been entered into; that such land, together with a lot which Mr. Whitney was obliged to purchase in order to secure the land necessary for widening, including interest at the rate of 6 per cent. from the date of purchase, has cost, in round figures, \$200,000, and the contracts for constructing the section of said bridge amount to \$25,000; total, \$225,000, as set forth in the third and fourth clauses of the petition, and that the West End Street Railway Company at a meeting held on August 9, 1887, adopted such purchases as made for its benefit, and authorized its treasurer to pay for the same upon receiving a deed of the land not needed for the widening, and said company also voted to assume said contracts for constructing the section of said bridge.

In order to secure the widening of Beacon Street and a location for the railway, Mr. Whitney agreed to do, or cause to be done, certain things necessitating an expenditure in round figures of \$225,000. He did not declare his agency, but it is a reasonable inference that he was in fact acting in behalf either of the West End Land Company or the West End Street Railway Company, or of both. The land company owns the railway company, subject to the rights of the preferred stock, which so far as concerns the question now being considered is practically an 8 per cent. mortgage. The ownership of the two companies being the same, the owners will have just as much actual property whether this \$225,000 is paid by the land company, or by the railway company, but if this debt is thrown on the railway company, and authority is obtained to increase the capital stock of the company therefor, then the owners of these two properties will have stock of the railway of the par value of \$225,000, which they will not have if the debt is paid directly by the land company. It is natural, therefore, that they should desire to have this debt assumed by the railway company. The West End Land Company is the parent company. It was not formed for the purpose of contributing to the value of the West End Street Railway, but the organization of the West End Street Railway Company was subsidiary to that of the West End Land Company.

The price at which the shares of the West End Land Company are now selling shows that the public considers that the widening of Beacon Street, the grant of the location of the street railway therein, and the consolidations authorized by the Legislature of last year, have increased the value of its property fourfold. It is extravagant to claim that the whole of the benefit arising out of the widening of Beacon Street has accrued to the street railway company, and that the land company has received no benefit therefrom. It is evident that only a portion of that benefit has accrued to and is equitably chargeable to the West End Street Railway.

It is urged that these expenditures should be assumed by the street railway company because the location would not have been granted to it had not Mr. Whitney entered into the above agreement. This is probably true, and yet it does not follow that the expenditure resulting from the agreement ought to be borne wholly by the railway company. If this land company were owned by one set of people, and the railway company by another, it needs no argument to show that the railway company would be unwilling to assume such a debt for the sake of securing such a location, and suffer the land company to reap the benefit of the improvement without sharing the cost.

Of a similar nature to the claim for an increase of capital, contained in the third and fourth clauses of the petition, is that set

forth in the fifth clause. It appears that Mr. Whitney, in order to secure the widening of Beacon Street, through Brookline, from 50 feet to 160 feet, and a location for the railway in said street and other streets in said town, agreed to convey or cause to be conveyed to the town, about half of the land necessary for the widening, on condition that the remainder of the various lots thus contributing should be free from betterment assessments, and he further agreed to pay \$150,000 toward the expense of constructing the new widened roadway. The railway company asks that an increase of capital to the amount of \$320,000, or \$40,000 per mile of contemplated single track may be authorized, in order to enable it to pay the land company what the land taken for the widening cost, with 6 per cent. interest thereon, and also the above sum of \$150,000, so that, in this case also, it is proposed that the railway company shall assume the cost of the benefits accruing to both enterprises. Nay, more, the land company is both to receive pay for the land taken and also to be relieved from all betterment assessments. Some of the owners along the line of Beacon Street, men of acknowledged experience and wisdom in real estate matters, did what the land company did. They contributed so much of their land as was necessary for the widening, on condition that the remainder of their estates should be exempt from betterment assessments. It is, further, an instructive fact in this connection, that many of the owners of land on Brighton Avenue in Boston, from the forks of the road, a distance of about one and a half miles, to Massachusetts Avenue, have agreed to contribute a strip of land ninety feet wide for widening Brighton Avenue. The proportion which the amount of betterment assessments on each lot will bear to the value of the land taken for the widening of course varies according to the shape and area of the lot, and evidence was submitted to show that the West End Land Company's lots between St. Mary's Street and Washington Street were mostly shallow lots, so that the release from betterments was not relatively so valuable to the West End Land Company as to the other owners who contributed their land. It is reasonable, however, to conclude that the value to the West End Land Company of the release from betterment assessments, while it may not equal the value of the land contributed, would still make up a very considerable portion thereof, and the impropriety of authorizing an increase of capital to enable the railway company to refund to the land company the whole of the cost of such land is obvious.

In relation to the claim that the railway company should pay the \$150,000 which Mr. Whitney agreed to contribute for the construction of the roadway, it must be remembered that the portion of the roadway occupied by the railway tracks is only twenty feet, while

the street is widened from fifty feet to one hundred and sixty feet, or five and a half times the width required for the car tracks. While these figures are by no means conclusive as to the proportion of expense which should fall on the West End Land Company and the West End Street Railway Company respectively, they nevertheless make it clear that the widening was not undertaken solely in the interest of the West End Street Railway.

On the other hand, the whole of the expenditures incurred in consequence of Mr. Whitney's agreements with the city of Boston and the town of Brookline should not fall upon the land interests alone of the West End Land Company. This improvement having its origin in private enterprise, and carried forward to assured success, with remarkable courage and ability, is a great public improvement, and the Board believes that it is both equitable and consistent with the rights of the public that a portion of these expenditures should be assumed by the railway company, and capital stock issued therefor.

The circumstances are, however, exceptional, and the Board is unable to find in the statutes any sanction for an allowance of an increase of capital of a street railway for the purposes set forth in the third, fourth and fifth clauses of the petition.

As above stated, the statutes authorize a street railway company to purchase and hold such real and personal estate as may be necessary or convenient for the operation of its road. To hold that these words cover the purchase of real estate to be contributed to the widening of a street, especially when the tracks are not located on the land so purchased, would be giving them a scope evidently not within the intent of the Legislature, and, in the opinion of this Board, unwarranted. There is no other authority given in the statutes for the purchase of real estate by a street railway company, and the specific grant of authority to purchase for one object implies a lack of authority to purchase for other objects.

By section 7 of said chapter it is provided that the board of aldermen of a city, or the selectmen of a town, may grant locations "under such restrictions as they deem the interests of the public may require."

The power to impose restrictions necessarily implies power on the part of the railway company to incur such expenditures as may be necessary or proper in order to comply with the restrictions, and the question arises whether the restrictions which were imposed in the case of this railway cover any portion of the expenditures under consideration. Neither in the grant of the location in the city of Boston, nor in that in the town of Brookline, was there any restriction or provision requiring the railway company to contribute, or

cause to be contributed, any land for the widening of the street, or any sum of money to pay for the construction of the roadway, nor in either case was the grant of location declared to be dependent upon the widening of the street. Moreover, if such requirement or proviso had been expressed, it could not properly have been considered a restriction within the meaning of the statute.

It may be claimed that these agreements entered into by Mr. Whitney were the considerations for the respective grants of location. Although the location was granted in Boston on December 27, 1886, and the vote for widening Beacon Street was not passed until March 28, 1887, although the location was granted in Brookline on December 28, 1886, and the vote to widen Beacon Street was not passed until March 29, 1887; although one member of the Board of Selectmen of Brookline testified that he did not think the town would have been justified in revoking the location if the proposition to widen Beacon Street had failed; although at the time when the location was granted in Brookline it is doubtful whether Mr. Whitney had entered into any agreement legally binding upon him, — nevertheless, the Board is of the opinion that the grants of location would not, in fact, have been made had not the Board of Aldermen of Boston and the Selectmen of Brookline had confidence that the propositions made by Mr. Whitney, whether legally binding or not, would be carried out in good faith. But if these agreements are regarded as the considerations for the grants of location, the Board is equally at a loss to find in the statutes any authority for such expenditures. In some States railway locations are sold in accordance with special provisions of law therefor. In this State, not only is there no direct statutory provision authorizing a sale of a location, but the authority given to boards of aldermen and to selectmen to grant locations subject to certain “restrictions,” indicates no intent on the part of the Legislature to authorize sales. If the Legislature had intended to give such authority, it would not have used simply the word “restrictions.” Moreover, the Board believes that no sale of a location has ever been made in this State. Certainly no sale has been made with the knowledge and approval of the Board.

The only other theory which has been advanced is that these expenditures were necessary incidentals to the grant of location. It is a well settled principle that corporations, besides those powers which are specifically granted to them, have also such implied or incidental powers as are reasonably necessary for the purpose of carrying into effect the powers expressly granted.

In section 2 of chapter 113 of the Public Statutes, a street railway company is described as a corporation “for the purpose of construct-

ing and operating a street railway for the conveyance of passengers.” The argument is that the expenditures under consideration were prerequisite to the construction and operation of the road, so that the power to incur them is implied. Some expense for advertising, legal services, etc., is necessary in securing any location, and the amount which should be allowed therefor differs according to the peculiar circumstances of each case. The expenditure in the case under consideration is not only unusual in its nature, but extraordinary in its amount. Each of these characteristics is inconsistent with the theory of implied power. The capitalization desired for this incidental purpose is \$545,000. Even if the purpose for which these expenditures were incurred was common to such corporations, still the Board would not be justified in allowing for incidentals such an amount, nor any considerable portion thereof.

The Board therefore adjudges that it cannot, without further legislative authority, approve of an increase of capital for either of the purposes set forth in the third, fourth and fifth clauses of the petition.

To recapitulate : The Board deems that the following expenditures are reasonable and within the powers of the corporation : —

For construction and equipment of eight miles of single track,	\$240,000 00
For erection of stations, car houses, stables, etc.,	75,000 00
For car house and stable lot near Chestnut Hill Reservoir,	25,000 00
For car house and stable lot on Beacon Street,	168,000 00
For expense of filling the two preceding lots,	8,500 00

Total,	\$516,500 00
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Out of the original capital of \$80,000, there has already been expended, for purposes adjudged as above,

to be <i>ultra vires</i> ,	\$2,061 00
Balance of cash on hand,	50,358 36

Total,	\$52,419 36
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Which sum being deducted from the total expenditures, authorized as above, leaves as the amount of additional capital needed, \$464,081 00

The Board therefore authorizes an increase of capital for the above purposes to the amount of \$464,000, making the total capital of the company \$544,000.

For the Board,

GEORGE G. CROCKER,
Chairman.

[J.]

CIRCULAR AND LETTERS

RELATING TO THE HEATING AND LIGHTING OF CARS.

COMMONWEALTH OF MASSACHUSETTS.

BOARD OF RAILROAD COMMISSIONERS,

20 BEACON STREET, BOSTON, June 25, 1887.

To the ——— Railroad Company.

Please send this Board, at your earliest convenience, a statement as to your outfit on all the lines operated by your company, for heating your passenger, mail and baggage cars. If provided with different kinds of heaters or stoves, state the number of each kind. Please also state any special methods of protection against fire, outside of the heaters, used by you during the past winter. Please also state what changes you have contemplated for the coming winter, and what experiments in heating you propose to make.

The above information is desired in order to enable the Board to take action under chapter 362 of the acts of the present year. Hearings upon the matters covered by the act will be given at some future date. The Board at the present time desires to collect information as to the outfit of the various railroads in the Commonwealth, and will be glad to have the information as full as possible.

Per order,

WILLIAM A. CRAFTS, *Clerk.*

Another circular on this subject, which circular is inserted in the report, page 61, was issued November 28, and the following answers to it have been received:—

BOSTON & ALBANY RAILROAD COMPANY,

OFFICE OF THE PRESIDENT,

BOSTON, Dec. 15, 1887.

DEAR SIR:—The circular of the Board dated Nov. 28, 1887, was duly received.

In reply to the first question: The passenger, baggage and mail cars of this company are equipped with heating apparatus as follows:

Baker heaters, 98 ; Johnson heaters, 44 ; Searle heaters, 14 ; Martin steam heat, 101. It is proper to say in this connection that nine baggage cars have coal stoves, but that no passenger, mail or baggage car belonging to this company running in this State has been heated by stoves since the passage of the law prohibiting their use.

Second. We find no difficulty in heating passenger cars with steam taken from the locomotive. The only device in use on this road is the Martin. The coupling, however, is far from perfect ; the slip joints wear loose and leak ; the ball joints are defective in construction and the asbestos disks are liable to tear apart in uncoupling, but with time and experience no doubt all these defects will be remedied.

The cost is less, but how much it is impossible to say. There is so much surplus energy developed in a locomotive engine that it is difficult to measure the additional coal used for heating purposes.

Third. My own opinion is, if it is desirable to have a uniform system of coupling, that the best way to bring it about is to ask the trunk line executive committee to appoint a committee of mechanical experts to consider the whole question, and recommend a coupling which on the whole seems to them the best.

Fourth. It is our intention to equip the rest of our cars, passenger and baggage, with the Martin system as fast as possible. Probably during the winter our whole equipment will be changed.

Fifth. The greater part of our cars are lighted with the Page and Williams lamps, which burn mineral sperm oil three hundred degrees fire test. We have, however, two trains running between Boston and New York lighted by electricity. Without taking into consideration the cost of maintaining storage batteries, electricity costs about ten times as much per burner as oil. How much additional is to be charged to the batteries we are not able at present to tell, for their life is not yet determined, but we have information sufficient to warrant us in saying that in the present state of the art this method of lighting cannot come into general use.

Sixth. I am not aware that any accident has happened on this road during the past five years occasioned by our methods of lighting.

Yours truly,

WILLIAM BLISS, *President.*

Hon. GEORGE G. CROCKER, *Chairman Board of Railroad Commissioners.*

BOSTON & MAINE RAILROAD.

GENERAL MANAGER'S OFFICE,

BOSTON, Dec. 21, 1887.

To the Honorable Board of Railroad Commissioners.

GENTLEMEN: — Referring to your inquiry in relation to the equipment of cars for heating purposes, I will say that I am equipping our passenger cars with Baker and Johnson heaters as fast as it is possible for our men to apply them. We have now, in all, 260 cars equipped with these heaters. We have one with a Spear heater and two with Salmon heaters. We have 104 cars more, which we are proceeding to equip as rapidly as possible. I have not yet made application for any steam-heating apparatus which receives its heat from steam from the locomotive, although I have arranged with Mr. Sewall of the Sewall Car Heater Co. to test his system upon our through trains, which extend through to Bangor, over the Maine Central Railroad. Our Lowell system has now running 72 Baker heaters, 18 Johnson, 32 Spear, 3 Creamer and 14 Chilson stoves. On this system we are applying Baker Perfected heaters as fast as possible, and have arranged with Charles Sherburne of Boston to equip one train on the Central Massachusetts Railroad with the Sewall steam heating system. I have not progressed as rapidly as I expected to in the application of Baker and Johnson heaters, but am putting them in as fast as we can secure heaters. I am putting in more of the Baker than the Johnson, for the reason that there is a difference in the price of about \$60.

Yours truly,

JAMES T. FURBER, *General Manager.*

BOSTON & PROVIDENCE RAILROAD CORPORATION,

PRESIDENT'S OFFICE, BOSTON, Dec. 2, 1887.

GEORGE G. CROCKER, Esq., *Chairman Honorable Board of Railroad Commissioners.*

SIR: — In reply to your circular of Nov. 28, 1887, I would say: — First. The present "outfit" of this road as relates to cars fitted for taking steam from the locomotive is as follows: —

Eighteen Sewall, 20 Gold and 17 Boston & Providence — 55 in all.

Second. As we operate three different systems in combination, we can give no statement in regard to the relative efficiency of one or the other, nor have we had sufficient experience to compare steam heating with the old system of individual heaters or stoves.

Third. We use the Sewall coupler.

On Wednesday last, November 30, a committee of railroad clubs from the Eastern, Middle and Western States met at Buffalo to consider the subject of steam couplers. Mr. George Richards, the master mechanic of this road, was present, and reports that after a session of four hours the committee adjourned, to meet in New York at some future time. No decision was arrived at, but the sentiment of the meeting was in favor of using rubber hose rather than metallic pipe between the cars. It would therefore seem that the best method of securing uniformity of steam coupler still remains an open question.

Fourth. We shall continue to equip cars with steam heating apparatus as rapidly as possible.

Fifth. We have never made any experiments with electricity for lighting cars. We light by mineral sperm oil. Some of the Wagner cars on the Shore Line and all on the Stonington Boat Line burn Pintsch gas.

Sixth. No accident has ever occurred on this road from the methods of lighting in use.

I beg to hand you herewith copy of a letter addressed to the superintendent by Mr. Stone of the Providence, Warren & Bristol Railroad. This road is but $14\frac{1}{2}$ miles long, and all the cars are stored in Bristol, where *they are under cover*.

Yours respectfully,

HENRY A. WHITNEY, *President*.

[COPY.]

PROVIDENCE, WARREN & BRISTOL RAILROAD COMPANY.

PROVIDENCE R. I., Dec. 1, 1887.

A. A. FOLSOM, Esq., *Superintendent Boston & Providence Railroad*.

DEAR SIR: — Yours of 15th ult., asking me to give my views and experience with the Gold heater, came duly to hand. In reply I will say that to-day is the first day since we put the heaters in when it has been cold enough to give them a fair trial. This morning the thermometer registered six degrees above zero and we had no difficulty in keeping the cars warm. In fact the conductor said the only comfortable place he could find this morning was inside the cars.

As you know, trains from Bristol take on at Warren two Old Colony cars which are not fitted with the heaters, so that on leaving Warren we have no connection with the locomotive to the heaters; notwithstanding this the cars were perfectly comfortable all the way up. The 7.30 A.M. train from Providence found the cars so comfortable that steam was shut off before leaving and not turned on again during the trip to Bristol.

The storage feature of the Gold system, you will remember, was the feature which determined us to adopt this method of heating, as without this we could not keep the cars warm while the locomotive connection was severed. We keep the cars warm during the night by means of an underground connection from the engine house to the car house, — steam being taken from the locomotives.

Undoubtedly, any of the systems will keep the cars warm while connected with the locomotive, but when this connection is broken, as while train is taking on passengers at terminals or by putting a car between locomotive and train which is not equipped, as is often done, I think trouble will be found with all except the Gold.

Without expressing any opinion as to the proper coupling to be adopted I will only say that, whatever coupling is to be the standard, it seems to me that as the coupling is the lowest place in the pipes, they should be properly trapped and for this Mr. Gold holds letters-patent.

Yours respectfully,

(Signed)

WATERMAN STONE,
Superintendent.

BOSTON, REVERE BEACH & LYNN RAILROAD,
350 ATLANTIC AVENUE,
BOSTON, Dec. 3, 1887.

To the Board of Railroad Commissioners of Massachusetts.

GENTLEMEN:—In response to your circular of 28th ult., the undersigned is authorized to make reply giving the information requested in said circular under the specific heads therein mentioned, as follows:—

First. Our present outfit for heating cars, and changes made since previous return.

We have made the radical change of removing all stoves and fire-heaters from our cars and substituting therefor a system of heating by steam from the locomotive, — said system being of our own design and workmanship. To this end we have equipped all our locomotive engines, — ten in number, — also twenty-three of our passenger cars, being all that we are ever called upon to use during winter time, with the requisite apparatus for permitting steam of low pressure to circulate through the radiator pipes of the cars.

A brief description of our system is as follows: A main steam supply pipe is carried from locomotive to rear of train, with suitable couplings and hose connections between cars. The main steam-pipe leaves the boiler near the top of the dome and, passing down outside and in front of cab, thence extends to couplings at rear of tender. A common globe valve (Jenkins pattern), with large hand wheel in

the cab, allows steam to be admitted into the pipe at any pressure, from one pound upward. We find no difficulty in adjusting this valve to any pressure desired; but to make sure that under no circumstances can steam above a certain pressure, say ten or fifteen pounds, enter the train pipes, we place a small "pop" safety valve on the main pipe below the regulating valve, set at the limit fixed upon, with a pressure gauge set just over the engineer's front window in the cab. The main pipe is continued under each car its entire length, on the side opposite to that of the air-brake pipes and hose.

The lowest point of the main pipe is at the centre of the car where branches ascend to the radiators (one on each side), which are simply elongated loops of two-inch pipes extending under the seats along the "truss plank" to each end of the car, and thence returning on a proper grade to the middle of the car, whence the drip pipes convey the water of condensation to a frost proof steam-trap below the car floor. A stop-cock is placed in the main supply pipe at each end of every car, also steam admission valves are placed under the middle seats on each side, whereby the steam can be shut off from either radiator, or from the entire car, at pleasure and independently of any other car of the train. Thermometers are placed in each car. We allow about 125 square feet of heating surface to each car.

In addition to the above-described train attachments we have arranged at each terminal station a system of steam supply pipes, with branches for each track on which cars stand at night or are laid off as spare during the day, said pipes being connected in the one case with the locomotives that are put up under steam in the round-house near by, and in the other case with the boiler of a hoisting engine at our coal wharf; the object of this arrangement being to supply steam to trains or spare cars when disconnected from the engine, this service being at night time attended to by the watchmen. It is only needed, however, during extreme cold weather, and chiefly in order that the cars may be well warmed at the very moment they are needed for use and to prevent the possibility of annoyance and delay in getting trains properly steam-coupled and in good working condition for the early morning trips. All steam-pipes exposed to the atmosphere, both on the cars and locomotives and at the terminal stations, are carefully covered with approved non-conducting material,—first, sheet-asbestos; then alternate layers of hair-felt and asbestos; the whole covered with paper and canvas, painted.

The work of equipping our trains with steam-heating appliances was begun about the middle of September last, and finished in work-

ing order the 18th of October. Owing to the short time available, considerable outside labor had to be hired at prices much higher than our own rates of wages. The total cost, however, of our steam-heating system, including all labor and materials, patterns, couplings, cutting and fitting, removing stoves and heaters, etc., has averaged \$70 per locomotive and \$170 per car.

Second. As to the practical working of the steam heating system as adopted by us, and its relative economy and efficiency as compared with our old system of individual heaters or stoves.

Our method of practice has been to place the master-mechanic in full charge of the system in its operation and maintenance, to whom the men report when repairs are needed, and from whom they receive specific instructions from time to time. The engineer of the train sees that a proper supply of steam is furnished and is responsible for the proper adjustment and handling of all cocks and valves, exclusive of those inside the cars, which are under the control of the conductor. As a rule the engineer is able to control the proper amount of heat for his train simply by setting his regulating valve to the necessary pressure. We dispense with the expensive and frequently unreliable "reducing-pressure" valve, since by using a common globe-valve with a large hand-wheel, for fine adjustment, in connection with a sensitive pressure gauge, we can easily obtain any given pressure from half a pound upward, by pound or half-pound increments, or at once. In the severest weather thus far experienced this season (6° above zero), we have had occasion to use only eight to ten pounds pressure for a train of four cars, and usually from one to five pounds is abundant. Unless there is much wind we find that a car is comfortable when the thermometer shows 60°, warm at 65° and hot at 70°. If the wind is blowing hard about 3° higher temperature seems necessary to produce equal comfort.

In point of uniform distribution of heat throughout the car, steam-heat is far superior to stove-heat, and there also seems to be a freer radiation of heat from the steam-pipes as compared with those of hot-water heaters, so that passengers need never be troubled with cold feet. As to the economy of steam in comparison with stoves or heaters, we think that but little if any saving is effected over the old systems. The cost to us of train fuel in previous seasons has been, annually, about ten per cent. of our recent outlay for steam-heating plant, and this amount could probably be saved if the expense of steam-heating were confined simply to supplying steam from the locomotive to heat trains, since we fail, as yet, to see any appreciable increase in locomotive fuel used on this account. But we find it advisable at present to employ a man to act as inspector, who is expected to remedy small defects as they may arise, replace

hose, make slight repairs, attend to the auxiliary heating at terminal stations when the weather requires it and to see that the apparatus is kept up to a good standard of efficiency. There should be added to this the cost of extra fuel for auxiliary heating. Taking these items into account, it is not likely that we can fairly reckon more than two per cent. on the cost of the plant as saved in expense of train heating by substituting steam for stoves.

The plan of heating trains by steam is one that presents peculiar difficulties which are only to be overcome by patient attention, careful and intelligent supervision and the substantial acquisition of this new art on the part of the train hands and other employees concerned in its application. These difficulties are not great until the thermometer begins to fall considerably below the freezing point. Even then there is little trouble while the train is running and steam is circulating freely through the cars. When the locomotive is detached, however, for any length of time the couplings must be separated so that hose may drain and prevent freezing, and if traps are used they must be frost proof. There is also danger that in extreme cold weather the steam may be carried at too low pressure, causing sluggish circulation and failing to force along the water, which is thus liable to accumulate and freeze at the lowest or most exposed points; or this result may occur from the cocks or valves being left almost closed instead of wide open. During the recent brief period of severe weather we had very little trouble with our system; but one car was for a short time disabled and this was due to the night watchman, who had not at the time become familiar with his new duties, failing to see that the water was occasionally blown off during the night from his supply pipes, — its presence checking the flow and pressure of steam and finally allowing ice to form in the hose connections and drip-pipe at entrance to trap. None of the traps themselves were frozen up, and there was no trouble with the hose couplings.

The difficulties thus far met with and overcome give assurance of the complete success of the system adopted, and we have no desire to return to the former method of heating. Steam easily bears the palm as regards safety, comfort and convenience, and seems equally well adapted to suburban or long distance service; furthermore, owing to the ease with which the heat can be controlled, it would seem to be particularly advantageous in those extensive sections of the country where an extremely cold temperature rarely prevails. It gives increased seating capacity, a uniform distribution of heat, — which can be quickly increased or diminished at pleasure, — and entire freedom from coal dust and ashes.

Third. As to the form of steam-pipe coupler used by us and its

working in actual daily practice, together with suggestions in regard to the best method of securing uniformity of steam-coupler, or such arrangement or device as will render it possible for cars of different roads to be brought into the same train, irrespective of which end of a car is presented to the next one, so that all may be heated by steam from the locomotive. We early recognized the fact that a good, efficient and thoroughly reliable steam-coupling for connecting the pipes between contiguous cars and between locomotive and train, that should not require constant watching and tinkering to keep tight and that would couple and uncouple readily by hand when cars were standing, and would part automatically when locomotive or cars were detached from train, was the *sine qua non* of steam-heating. In our case these conditions were very important, owing to the constant manipulation of the couplings made necessary by our short runs, each locomotive being obliged to turn and shift a dozen or more times a day, besides frequently taking on and laying off extra cars. Inasmuch as none of the devices offered to us seemed adapted to our requirements, we were compelled to invent one that should the better suit our needs, and fortunately succeeded in producing a coupling that although extremely simple has thus far fulfilled the conditions we have mentioned, and still continues to do its work to our entire satisfaction. It consists simply of a hollow conical plug, with slight taper, fitting into a corresponding socket, the end of the plug pressed against a rubber gasket at base of socket by steel springs on the socket portion, making a perfect steam-tight joint which is further secured by a ring gasket recessed midway in the ball of the socket. The springs are adjusted to allow easy coupling by hand, riding over the shoulder of the male end, but resist tendency of the couplings to blow apart even under fifty or sixty pounds of steam, yet at the same time permit a moderate strain on the hose, not over twenty-five pounds, to pull the couplings apart automatically when train parts or locomotive is detached.

The male and female coupling, however, is not the form most likely to meet with favor as a standard coupling for universal use, for when terminal Y's are used by which the entire train is turned, end for end, and cars are afterward taken on or left at junction points, or where different roads exchange cars, it would be necessary to carry a male and female coupling on each end of every car as well as on locomotive tenders to avoid miscoupling; hence the standard coupler for general use should couple perfectly with itself on the principle of a car coupler, or as the right hand of one person perfectly fits and grasps the right hand of another person. Such a coupler we have recently perfected and are about to put in use. It is in two forms: one combining the male and female parts in itself

with a bifurcated steam-passage, and the other on the butt-joint principle either with single or double steam-ways. In both we retain the spring principle of causing endwise or longitudinal pressure against the face of gaskets, and to allow of automatic uncoupling, with provision also for easily parting the couplings by hand when cars are standing still.

We are also turning our attention to obtaining a substitute for rubber hose, which while it has many excellent and valuable qualities does not possess sufficient durability. Of the different forms tried, a plain four-ply steam-lined hose seems to give best satisfaction. The metal connections thus far introduced require so many parts and joints to yield to all the complex motions of contiguous cars, that it is very difficult to keep them tight, and, when the water of condensation freezes the metal surfaces together, trouble is sure to result when cars separate. The steam-way in these connections is also much obstructed.

As to the method of ascertaining what form of coupling might best be recommended as the standard appliance, it would seem that a series of exhaustive tests with a number of different couplings on a trial train, conducted in the coldest weather and under all possible conditions of actual service, would go far toward settling the question. A preliminary classification followed by subjecting the different devices to simpler forms of tests—such as a continued exposure to a very cold atmosphere under a high steam pressure to test tightness, the steam being then cut off, say for twelve or fifteen hours to test for freezing up—might result in reducing the really meritorious devices to a small number to be submitted to the final test upon a train in motion. The train test should include two days, in order that after standing cold all night the behavior of the different couplings in warming up the train the next day might be noted.

By way of contributing our mite toward such a determination, we ask leave to state what we have been led to consider the essential points of a good steam-coupler, as follows:—

First. It should be steam tight. This is, of course, of paramount importance. If the coupling is not steam tight, and if it does not remain so after severe and constant use, it is a complete failure from the start. To secure tightness we think it is necessary that some form of gasket or elastic packing be employed—not easily displaced or lost—and that the shrinkage of said gasket be compensated for and taken up by the automatic action of the parts pressing against the gasket; also, that the interlocked parts have sufficient bearing surface to secure not only a good working fit, but also steadiness or rigidity of the parts when coupled, preventing motion, vibration and wearing of the metal surfaces in

contact; and, furthermore, the parts should be firmly held together under all conditions and exigencies of service, allowing neither a slight separation causing leakage, nor the blowing apart of the couplings altogether.

Second. It must be simple, of the fewest possible parts, free from complication, its use and manipulation easily understood and applied by the average train man, and so perfectly obvious in its design and operation as to require no special teaching on the part of the men who are to handle it. This is particularly desirable in case of the interchange of cars running over several roads and passing into the control of successive gangs of train men. There must also be such simplicity of design as shall reduce the cost of maintenance and repairs to a minimum; small parts, essential, but liable to be detached, tampered with, broken or lost, — screw-threads, nuts, bolts, retaining rings, ground joints, packing glands, spiral springs, levers, chains, etc., — must be avoided.

Third. It must be strong and durable, able to stand rough usage without breaking or disturbing the adjustment of parts or causing leaks; and there should be no weak or delicately made parts which either invite abuse, fail when most needed, or give constant trouble to keep in efficiency.

Fourth. It should couple and uncouple by hand with the greatest ease and without the necessity of separating the cars in order to do so; and it must be done without any rotating or twisting motion. Furthermore, the hose should uncouple automatically without the intervention of the hand or any appendage that might be easily lost or unfastened, such as a slack chain, cam-lever, etc., the uncoupling being done simply by a comparatively slight strain on the hose, as the cars pull apart, with no possibility of breaking the hose or injuring the couplings themselves.

Fifth. It should consist of only two coupling members; that is, one on each piece of hose or pipe, without the intervention of a third member such as is used in the so-called "double" couplings. In such couplings the third or middle member, into which the other two fit, is liable to be detached and lost, thus rendering the other two parts useless.

Sixth. There should be a sufficient protection against the exposed parts of the coupling at the tail-end of the train becoming coated with ice and sleet, or filled up with sand, gravel, etc., which, either by freezing on to the exposed parts or by filling up the sockets, grooves or recesses, etc., make it difficult or impossible to couple on the steam hose of another car or to make the joint steam-tight, besides injuring the gaskets and bearing surfaces.

Seventh. It should be universal; that is, the same form of coup-

ling should be applicable to each end of the car, being so constructed that its parts will perfectly interchange with and fit into, or interlock with, the opposite parts of the same kind of coupling, reversed, the same as the Miller or Janney types of car couplers.

This will avoid the necessity of carrying two different kinds of couplings on each end of cars and locomotives, so that they will couple when turned round or end for end, and so placed in a different position relative to the other cars in the train.

Fourth. As to further improvements in our heating outfit we do not consider that any will be needed, save in matters of detail such as experience may render advisable. We are carefully watching the operation of our system and are seeking to make it a practical success in every respect. Our studies will be in the direction of simplicity and durability, together with greater ease and economy in maintenance.

Fifth. As to our system of lighting cars, kinds of lamps and oil used, and in regard to electric lighting. We use, as required by law, an oil having a so-called fire-test of not less than 300° Fahrenheit. It is a product of petroleum, made from a refuse grade of stock far inferior in burning qualities to that of the ordinary "safety" oil of 150° or 160° fire test. It gives a much poorer light and is, in the opinion of competent experts, not a whit safer than 160° oil. In the latter, the flame while whiter and more luminous is not so tenacious, and, if a lamp is thrown down or broken, is more likely to go out than in the case of the former; while, if the flame comes in contact with the oil, the one kind will burn as readily as the other,—the poorer grade (300° oil) burning with a fiercer heat. The flame of the 300° oil is of a dull yellow, and the lamps and wicks require more care in order to get good results. We have been informed that in the original draft of the statute (chap. 112, sect. 172) the igniting test was made 150° instead of 300°, but changed at the instance of a manufacturer, who, at the time, had exclusive control of the process of making that grade of oil, to which the poor quality of light frequently complained of by passengers may be in large measure traceable.

The kind of lamps used by us is chiefly the ordinary two-light car lamp, each wick fed by a small tube from a central fount, which with the body of the lamp is made of spun metal, brass or bronze. We also use in our summer cars metal lamps set in a square case with glass sides and lantern top, to prevent the lights blowing out by the constant draughts present when windows and doors are wide open, as is usually the case during the season those cars are run. We have had no experience with methods of lighting cars by electricity or gas.

Sixth. In regard to accidents resulting from our methods of lighting cars, we are pleased to be able to say that we have had no accident within the past five years, nor since the opening of the road, that could be traced, either directly or indirectly, to the means which have been employed for lighting cars.

Respectfully,

C. A. HAMMOND,
Superintendent.

Boston, Dec. 5, 1887.

CHESHIRE RAILROAD COMPANY,
OFFICE OF GENERAL MANAGER,
KEENE, N. H., Dec. 3, 1887.

GEORGE G. CROCKER, *Chairman Board Railroad Commissioners of
Massachusetts, Boston.*

DEAR SIR:—In reply to your circular of 28th ult. we have to say, —

First. Our passenger cars are equipped for heating with the "Howard passenger car heater," the "Eaton car stoves," and the "Spear heater" with pipes and registers the entire length of cars.

The first two styles of heaters are for burning wood and the last for coal; all our car heaters are firmly bolted to the car floors. The doors to the Howard and Eaton heaters are secured with chains besides the usual door fastenings. The Spear heaters are fastened with combs. We have made no change since last June.

Second. We have made, as yet, no plan or system of heating by steam from the locomotive boiler.

Third. Not using steam pipes yet.

Fourth. As soon as a system of hose and couplings can be adopted that will interchange with cars of connecting roads, we propose heating cars of this company by steam from the locomotives, as our cars run through on other roads each side of us, and their cars over this road. We have been slow as to the system to be adopted, and are examining and conferring with them for uniformity.

Fifth. We use mineral sperm oil (so called) of 300° fire test in centre and side lamps in all passenger cars used on this road; have had no experience of lighting by electricity.

Sixth. Have had no accidents from heating and lighting this way.

Very truly yours,

R. STEWART,
General Manager.

CONNECTICUT RIVER RAILROAD COMPANY,
PRESIDENT'S OFFICE,

SPRINGFIELD, MASS., Dec. 14, 1887.

GEORGE G. CROCKER, *Chairman Railroad Commissioners, Boston, Mass.*

DEAR SIR:—In answer to your circular of November 28, we enclose a statement of our present outfit for heating cars, in comparison with that of August 4.

	August 4	December 14.
Passenger cars, steam heat,	11	14
Combination cars, steam heat,	6	9
Baggage cars, steam heat,	0	1
Total,	17	24
Passenger cars, Eaton stoves,	8	5
Combination cars, Eaton stoves,	7	3
Baggage cars, Eaton stoves,	0	1
Total,	15	9
Passenger cars, Spear Hot Air Heater,	9	9
Combination cars, Spear Hot Air Heater,	1	1
Total,	10	10
Baggage cars, Baker Heater,	0	1
Baggage cars, common cast iron box stove,	3	0
Mail cars, Chilson Heater,	1	2

Second. On the fourth day of August, in reply to a previous circular which we received from you, we stated that we were using the Emerson steam system for heating our local trains. This system we shall apply this winter to all of our own cars in our through trains. In this reply which we made to you August 4, we answered fully, we think, the inquiry which you make in the second request contained in your circular of November 28.

Third. We have used a flexible pipe with our coupler. Our experience thus far leads us to prefer such a pipe to a metallic pipe coupler. The flexible pipes are lighter, more easily handled, and when broken, can be replaced at once by the train men. The improved flexible coupling which we are now receiving are much more durable than those we first used, and are very inexpensive. We have had no experience in coupling our system with the system used by other roads, and have no suggestions to make which are not apparent to every one. It is fair to suppose that the best coupling in the end will become universal.

Fifth. All of our cars, except as hereinafter mentioned, are lighted with Williams, Page & Company single and double oil lamps,

the single lamps having a glass fount, the double lamps a copper fount. The oil used is "mineral sperm," 300 degrees fire test. For several months past we have experimented with a plan for lighting our cars with electricity, produced by a dynamo operated in the baggage car of the train. The dynamo is operated by a small rotary engine, with power supplied through a tube from the locomotive. The amount of power taken from the engine is still undetermined, but the engineer reports that the loss of power is not sufficient to be appreciated in the ordinary working of the engine. Three to four cars are generally used in this train, with ten to twelve lights in each car. Connected with this plan is a storage on each train, capable of supplying sufficient electricity for one or two hours, to maintain the light when the train is still and the rotary engine and dynamo are not in operation. The supply for this storage is taken from the surplus electricity generated by the dynamo, and not used in lighting the cars, while the dynamo is in operation. The shifting from the dynamo to the storage is instantaneous, and not noticeable by the passengers. The lighting of the cars and the care of this system is usually entrusted to a brakeman on the train. It is easily understood; the machinery seems to be durable and not easily put out of order. We are still experimenting with this system, and single train, and up to the present time are favorably impressed with it.

Yours very truly,

N. A. LEONARD, *President.*

FITCHBURG RAILROAD,
GENERAL SUPERINTENDENT'S OFFICE,
BOSTON, MASS.; Dec. 3, 1887.

GEORGE G. CROCKER, Esq., *Chairman Board of Railroad Commissioners,*
No. 20 Beacon Street, Boston, Mass.

DEAR SIR:—In reply to your circular of November 28th, I have to say,—

First. Our passenger equipment is at present provided with heaters and stoves as follows: 11 Baker heaters, 11 Westinghouse standard steam heaters, 6 Johnson steam heaters, 1 Searle steam heater, 60 Spear hot air heaters, 6 Creamer hot air heaters, 106 Spear stoves, 34 Railroad King stoves, 48 Chilson's Cone Disk stoves, and 11 cars are equipped with the Sewall system of steam from the locomotive. The Westinghouse standard steam heaters can be used to heat with steam from the locomotive. This shows an

increase of 5 Westinghouse standard steam heaters and 7 cars equipped with the Sewall system of steam from the locomotive since last report.

Second. The Sewall system of heating cars with steam from the locomotive is the only system of the kind which we have in use on the road. It is working fairly well, but we have not had experience enough with it to form any opinion as to the question of economy and efficiency of this system, as compared with the old system of heaters or stoves.

Third. We are at present using what is known as the Sewall form of coupler. It works well, and we believe it answers every purpose. I understand that there is a committee appointed, composed of officers of some of the principal railroads, for the purpose of investigating and considering the merits of the various couplings, with a view to ascertain which is the best, and securing its general adoption.

Fourth. We shall put in 12 Baker heaters this winter, which can be used to heat the cars with steam from the locomotive. The improvements which we shall make during the coming summer will depend upon the result of the experiments which are now being tried on this road, and also those which are being made on other roads.

Fifth. Our cars are all lighted by kerosene oil of 300° test. All the lamps used in our passenger cars are those made by Williams, Page & Co., Sherburne & Co. and Adams & Westlake. We have not any cars lighted by electricity.

Sixth. I do not remember of any accident which has occurred on this road during the past five years, caused by the lights in our passenger cars.

Respectfully,

JOHN ADAMS,
General Superintendent.

[COPY.]

GRAFTON CENTRE RAILROAD, GRAFTON, Dec. 2, 1887.

We are using a Chilson car heater (approved by the commissioners) on our car.

Yours truly,

A. O. HOWE, *Treasurer.*

OFFICE OF VICE-PRESIDENT AND GENERAL MANAGER,
HOUSATONIC RAILROAD COMPANY,
BRIDGEPORT, CONN., Dec. 9, 1887.

GEORGE G. CROCKER, Esq., *Chairman Board of Railroad Commissioners, Boston, Mass.*

DEAR SIR:—Below find answers to the questions contained in your circular letter of November 28, concerning the method of heating and lighting the passenger cars of this company:—

First. Present outfit, thirty-five passenger cars equipped with “Baker’s” inside car heaters, and piped for salt water circulation. (Five cars added since last report.) Seventeen mail, baggage and caboose cars equipped with “Spear’s” heaters. (Eight cars added to list.)

Second. None used.

Third. None used.

Fourth. The same as connecting roads adopt, if they find them a success.

Fifth. Three hundred degrees fire test kerosene oil in lamps.

Sixth. No accident of any kind has ever happened on this road from the methods of lighting now in use.

Respectfully,

WILLIAM A. STEVENSON,
Vice-President and General Manager.

NEW YORK & NEW ENGLAND RAILROAD COMPANY,
GENERAL SUPERINTENDENT’S OFFICE,
244 FEDERAL STREET, BOSTON, MASS., Dec. 6, 1887.

To the Honorable Board of Railroad Commissioners, Boston, Mass.

DEAR SIR:—Referring to your circular of November 28, which did not reach me in time to reply by the 5th, as requested,—

In June we reported 87 cars with Spear heaters; we have now 109.

We reported 170 cars with cast iron and cast and sheet iron stoves; we now have 44.

We reported four hot water heaters; we now have three. (One of the cars reported in June as hot water will appear later as having the Safety Car Heating and Lighting System.)

In June we had two coaches and one baggage car heated with steam from the engine, by the Sewall system; we have the same now.

Steam and hot air from the locomotive, three ; we have now eleven heated with steam and hot water heated from the locomotive and are fitting up eleven more.

In June we had seven baggage cars with cast iron stoves and twelve with cast and sheet iron stoves ; we have now one heated by the Sewall system, two fitted with the Safety Car Heating and Lighting Company's system, and fifteen stoves. (We have been obliged, at the request of the United States government, to put a stove in a car on account of mail, making one more.)

We had six express cars heated with stoves ; we have six now.

I would say that we have been delayed in making these changes by difficulty in getting the necessary material and have crowded it as fast as we could, and we expect to continue making changes. We think we will succeed in getting heat by the Sewall system and by the New York Safety Car Heating and Lighting Company's system also. It is too early for us to report as to the economy of these systems and also a little too soon to be absolutely certain of their entire efficiency.

We are using in couplers, the New York Safety Car Heating and Lighting Company's coupling and the Sewall coupler, and have tried the Westinghouse air brake coupler. All the couplings are tight and seem to work well. We are inclined to consider the Westinghouse favorably because it is well known and easily handled, while with the others, more or less has to be learned about them.

We expect to continue improvements in our outfit for heating as rapidly as we can until we have improved heaters in all our cars.

We light our cars with lamps, burning 300° fire-test oil, and have never known of any accident from their use. We have no experience in the use of electricity for lighting cars.

Yours respectfully,

A. A. JACKSON,
General Superintendent.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY,
SUPERINTENDENT'S OFFICE, NORTHAMPTON DIVISION,
NEW HAVEN, CONN., Dec. 19, 1887.

Hon. GEO. G. CROCKER, *Chairman, etc., Boston.*

DEAR SIR:—Replying to your circular letter of the 28th ult., relative to heating passenger cars,—

We have removed the stoves from all our cars except the Baker heater and Spear stoves. We have tried on this road no steam

device, as this road is now run as a part of the system of the New York, New Haven & Hartford Railroad Company. Their report on this subject will be taken to answer for us as to the future.

Yours, etc.,

CHAS. N. YEAMANS.

NEW LONDON NORTHERN RAILROAD,
SUPERINTENDENT'S OFFICE,
NEW LONDON, CONN., Dec. 13, 1887.

GEO. G. CROCKER, *Chairman, 20 Beacon St., Boston, Mass.*

DEAR SIR: — Answering your circular letter of Nov. 28th, would say in reply to first inquiry that our present outfit consists of common stoves, Baker and Creamer heaters. The Bakers have been added since last report.

To second and third inquiry I can give no information, as we have no system of steam heating on this road.

To fourth inquiry would state that we hope to add one or two more Baker heaters during the coming winter. And I also hope to have our people experiment with at least one train in steam heating; but that is not yet definitely decided. What will be done the coming summer I am unable to state at this time. Our method of lighting cars is from lamps of the Williams & Page or E. S. Greeley & Company pattern with 300° fire test burning oil.

To sixth inquiry would state that I have no knowledge that we have ever had any accident occurring from the present method of lighting.

Yours truly,

C. F. SPAULDING,
Superintendent.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY,
GENERAL SUPERINTENDENT'S OFFICE,
NEW HAVEN, Dec. 20, 1887.

GEORGE G. CROCKER, Esq., *Chairman Board of Railroad Commissioners
Commonwealth of Massachusetts, Boston, Mass.*

DEAR SIR: — Replying to your circular letter of November 28th, I enclose you herewith copy of report made by our master car builder.

Yours, etc.,

O. M. SHEPARD,
General Superintendent.

[COPY.]

CAR DEPARTMENT,
NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY,
NEW HAVEN, CONN., Dec. 19, 1887.

DEAR SIR:—In reply to questions as asked in enclosed circular from Board of Railroad Commissioners of the State of Massachusetts would state:—

First. The passenger and baggage cars are now equipped with either Baker & Smith or Spear heaters. At the time of our last report some few of the cars were equipped with stoves. These have now been removed and replaced with Spear heaters.

Second and third. We are at present testing two different systems of heating cars by steam from the locomotive,—one train being equipped with the Henney system and one with the Wilder system,—but it is too early as yet to determine the efficiency of either of these systems as compared with heaters.

Fourth. I have no information that any improvements in outfit for heating are intended during the coming winter or summer.

Fifth. Our cars are lighted by double centre lamps, central fount. Oil used, mineral sperm, 300° fire test. We are testing the Frost system of lighting cars by gas, which is giving satisfactory results.

Sixth. There has never been an accident on this road resulting from the methods of lighting cars.

Yours truly,

(Signed)

JAMES DENVER,
Master Car Builder.

OLD COLONY RAILROAD, OFFICE OF GENERAL MANAGER,
BOSTON, MASS., Dec. 7, 1887.

HON. GEORGE G. CROCKER, *Chairman Board of Railroad Commissioners,*
Boston, Mass.

DEAR SIR:—In reply to your circular letter of November 28 I submit the following statements:—

First. The outfit for heating passenger cars on this road prior to Oct. 1, 1887, was as follows:—

No. of	passenger	cars	with	Johnson	Hot	Water	Heater,	.	.	.	161
	baggage	"	"	"	"	"	"	.	.	.	0
	passenger	"	"	Thayer	Steam	Heater,	.	.	.	.	2
	passenger	"	"	locked	stoves	(as	heretofore	approved),	.	.	85
	baggage	"	"	"	"	"	"	"	"	"	33

Since October 1 the following changes have been made: The Johnson heater has been put into fifty-one passenger and two baggage cars; the New York Safety Car Heating and Lighting Company's

system (steam from locomotive) has been applied to three passenger and one baggage car; the Sewall system (steam from locomotive) has been applied to six passenger and two baggage cars, and the outfit is now:—

Johnson Hot Water Heater in	.	.	.	.	.	212	passenger cars.
" " " "	.	.	.	.	.	2	baggage "
Thayer Steam Heater in	.	.	.	.	.	2	passenger "
New York Safety Heater (steam from locomotive),	.	.	.	.	.	3	" "
" " " " " "	.	.	.	.	.	1	baggage "
Sewall system (steam from locomotive),	.	.	.	.	.	6	passenger "
" " " " " "	.	.	.	.	.	2	baggage "
Locked stoves (as heretefore approved),*	.	.	.	.	.	47	passenger "
" " " " " "	.	.	.	.	.	28	baggage "

Second. As to the practical working of the systems of heating by steam from the locomotive,—

The New York Safety Car Heating and Lighting Company's system has not, so far as tried, proved entirely satisfactory. The company is experimenting upon improvements.

The Sewall system is thus far working fairly well.

As to economy, the systems for continuous heating would probably show as favorably as any system of heating each car independently.

Third. The form of steam-pipe coupling used is the "Sewall," and I believe it makes a simple, economical and safe union between the cars.

Fourth. We are intending to continue the equipment of our cars with the Johnson hot water heater during the winter, or until the system of continuous heating shows greater practicability than has thus far been developed. What we shall do during the coming summer will depend entirely on the experience gained, during this winter, with the systems in use.

Fifth. Our cars are all lighted with lamps made to burn 300° kerosene oil. We have one car that has been lighted by the incandescent electric light.

Sixth. There has been no accident, to my knowledge, since the road has been in operation, that was caused by our method of lighting the cars.

Very truly yours,

J. R. KENDRICK,
General Manager.

* The apparent discrepancy in the number of cars heated with stoves is accounted for by the fact that thirteen of the Johnson heaters, recently added to the equipment, were put into new cars which had been running during the summer without heaters of any kind. Most of the cars with stoves are spare cars used only in case of necessity.

PROVIDENCE & WORCESTER RAILROAD COMPANY,
SUPERINTENDENT'S OFFICE,

PROVIDENCE, R. I., Dec. 5, 1887.

To the Honorable Board of Railroad Commissioners.

GENTLEMEN:—In conformity to instructions contained in your circular under date Nov. 28, 1887, I report as follows:—

Answer to query first, —

Report of July 3.

2 coaches, Standard Steam Heater.
11 coaches, Johnson Hot Water Heater.
6 coaches, Spear Hot Air Heater.
22 coaches Chilson stove.
9 smoking cars, Chilson stove.
6 baggage cars, Chilson stove.
1 coach, Westinghouse Heater.
3 mail cars, Johnson Heater.

Present Outfit.

2 coaches, Standard Steam Heater.
11 coaches, Johnson Hot Water Heater.
6 coaches, Spear Hot Air Heater.
21 coaches, Chilson stove.
6 smoking cars, Chilson stove.
1 baggage car, Chilson stove.
7 coaches, 6 baggage cars, 2 mail,
2 smoking, equipped with Martin's Anti-Fire Car Heater.
2 coaches and 1 baggage car, being equipped with Sewall system.

Answer to query second,— we have not used any system of steam heating a sufficient length of time to demonstrate its practicability or economy, but have come to the conclusion that to make the system a perfect success it will be best for this road to establish, at points where cars stand any length of time, a steam boiler, so that the cars can have a continuous connection with a steam-heating apparatus. We find that unless this plan is adopted coaches cannot be properly cleaned, lights kept in order for use and coaches warmed readily.

Answer to query third,— Martin rigid coupler with slip joint and ball socket, and Sewall coupler. Uniformity in style of coupler to be finally adopted is very essential, but we are not ready to advocate any particular one. Our objection to the Martin coupler is as follows: First, it is metallic and more or less rigid, the ball socket and slip joints being so constructed that it will leak steam after a short period of service; second, the length of coupler is such that it becomes a condenser, thus requiring a greater pressure and more steam to heat the cars.

Answer to query fourth,— we propose to thoroughly test the Martin and Sewall systems this coming winter, and if satisfied of the utility of either, will adopt the best system.

Answer to query fifth,— we use 300° fire-test oil, and cannot give

difference in cost between oil and electricity as we use oil exclusively.

Answer to query sixth, — Never had an accident on this road from using oil as a means of lighting cars.

I am respectfully yours,

CHARLES HOWARD, *Superintendent.*

WORCESTER & SHREWSBURY RAILROAD,
WORCESTER, MASS. NOV. 30, 1887.

To the Honorable Board Railroad Commissioners.

GENTLEMEN:—In reply to the questions to be answered in the circular received this day I will say we have made no changes in the manner of heating or lighting our cars. For our purpose we find that it would be a little inconvenient for us to heat by steam from the locomotive as our run is only three miles long, and disconnecting so often would cause our cars to be cold most of the time. We do not contemplate any further changes this winter or any other time unless it will be advantageous and better so to do. We burn lamps made by Williams & Page and use the mineral sperm oil, 300° test. We have the Chilson car stove placed in the centre of the car on the side, fastened very securely through the floor, well-protected from the woodwork and locked. We have never had the slightest accident from stoves or from lamps.

Very truly,

I. E. BIGELOW, *Superintendent.*

[K.]

CIRCULARS.*

COMMONWEALTH OF MASSACHUSETTS,
BOARD OF RAILROAD COMMISSIONERS,
NO. 20 BEACON STREET, BOSTON, Feb. 21, 1887.

To the General Manager or Superintendent of the ———— Railroad.

The Board desires to be informed if all the bridges on your road and branches are provided with guard rails or guard timbers. Please state whether you use either or both. If rails are used, describe the form and method of laying them, and how far from the abutments of the bridge they extend; if timbers, state the size, how fastened and the distance from rail.

An early reply is requested.

Per order of the Board,

WILLIAM A. CRAFTS, *Clerk.*

COMMONWEALTH OF MASSACHUSETTS,
BOARD OF RAILROAD COMMISSIONERS,
NO. 20 BEACON STREET, BOSTON, March 18, 1887.

To the Managers of the Several Railroads in Massachusetts.

You are requested to send to this office, at the earliest practicable moment, the strain-sheets and records of the first and latest tests of all the bridges on the roads operated by you.

State also whether any parts of said bridges which are essential to safety are so covered as to be concealed from inspection. Describe also the style of flooring.

Per order,

WILLIAM A. CRAFTS, *Clerk.*

* For circulars in relation to bridges and to the heating and lighting of passenger cars, see the text of the report and Appendix J.

COMMONWEALTH OF MASSACHUSETTS.

BOARD OF RAILROAD COMMISSIONERS.

No. 20 BEACON STREET, Dec. 20, 1887.

To the President and Directors of the ——— Railroad Company.

In their report for 1881 the Board recommended to the railroads of the Commonwealth a consideration of the various forms of guard rails for bridges, with the hope of securing a more extensive use of some form of safety guard. Though much has since been done in this direction, and although the bridges of several of the roads are well provided with efficient guard rails, there is still room for much improvement. The Board is so impressed with the importance of this subject that it has given careful consideration to the merits and defects of the different forms, and it urgently recommends the general use of the form herein described.

The object of the guard rail is to prevent a derailed truck from getting far enough off the track to strike any portion of the girder, or from becoming twisted so as to lead to further derailment. The floor of every bridge should, moreover, be so constructed as to be able to carry safely any derailed car or engine; and for this purpose the ties should be substantial timbers, measuring not less than six by eight inches, and spaced not more than eight, and preferably four or six inches in the clear. Efficient guard timbers outside of the rails should also be provided, notched on each tie and bolted at short intervals, — the object of such timber being to hold the ties in place, and to keep them from being bunched by a derailed wheel. Instead of notching the guard timber over the ties it may be simply bolted, and spacing blocks securely fastened between the ties to keep them apart.

In addition to such guard timbers, guard rails are requisite, so arranged as to bring a derailed truck nearly back to its proper position, and guide it across the bridge without allowing it to deviate more than a few inches from the rails. For this purpose outside guard rails and inside guard rails are in common use.

The ordinary arrangement of outside guard rails is as follows: the guard timbers before described are placed six or eight inches from the rails, and are sometimes protected with an angle iron fastened to the corner. At the ends of the bridge, or on each track at the end at which trains enter upon the bridge, curved rails extend from these guard timbers, flaring outward and resting on long ties.

The Board recommends the use of the inside guard rail, placed with a clear space of from seven to ten inches between the heads of the guard rail and the track rail, securely spiked to the ties, and with ends running to a point in the centre of the track on the side from

which trains approach. The distance of this point from the end of the bridge should vary in different cases, but should not be less than thirty feet, and preferably sixty feet on important bridges. If the approach is on a curve the guard rail should be carried further; and on sharp and short curves it is advisable to extend them entirely around the curve, or to run them to a point thirty or sixty feet from the bridge, and from this point to carry a single rail in the centre of the track around the curve. The point of the guard rail should be protected by an old frog point or by a bevelled wooden block to prevent any hanging chain from catching on the end. The distance between the track and the guard rails should be sufficient to allow a wheel to run between them without crowding either rail, or from seven to ten inches.

The Board considers that this form of guard rail is much more efficient than the outside guard rail in bringing a derailed truck back to its proper position. On many roads the outside guard rails extend but a short distance beyond the ends of the bridge, and are frequently curved abruptly so as to be nearly at right angles with the track. Furthermore, the long ties on which such guard rails rest are generally insufficiently bedded in the ballast outside of the rails. The tendency of such a guard rail is to stop the wheel which strikes it and to twist the truck still further, placing it at a greater angle with the track, and thus tending to increase rather than to diminish the danger of an accident. The Board consider such guard rails to be worse than useless, and recommend that they be replaced by inside guard rails without delay. Outside guard rails of proper length, slightly curved and properly laid, may accomplish their intended purpose, but they are wrong in principle, because they are struck by the wheel at the wrong end of the axle, and if they do their work at all, they do it at great disadvantage.

The objection is sometimes urged against inside guard rails that a mischievous person may place an obstruction between the guard and track rails, or that some obstruction may accidentally get there. The Board believes that this argument has no practical weight, and that even if a truck were derailed in this manner, it would by virtue of the guard rail pass safely across the bridge. A person who desires to wreck a train can find abundant means of doing it more effectual than this. Further objections are sometimes pleaded that the use of the snow-plough is rendered difficult, or that a hanging chain may catch on the point of the guard rail. These also appear to the Board to have little weight. The points may be protected as already explained, and the use of the snow-plough is no more interfered with than at any turnout or crossing. Finally, it is sometimes

urged that a truck, if derailed far enough to get on the wrong side of the point, would be still further deviated by the guard rail.

As long as a train holds together it is very rare for a truck to be off the track more than a few inches or a foot. If the train has parted and a truck is off by as much as one-half of the gauge, the wheels on one side of this truck would be off the ties and a smash-up could hardly be averted, no matter what shape of guard rail were applied. Certainly the ordinary form of outside guard rail would do no good. Furthermore, the possibility of such an accident at a bridge may be almost completely removed by extending either the guard rails or a single guard rail on curved approaches, as has been suggested.

Other devices are in use which have for their object not only to safely guide a derailed truck, but to replace it upon the rails. Some of these devices, if properly applied, appear to the Board to have great merit, and they do not desire to be understood as withholding their approval from them.

For the Board,

GEORGE G. CROCKER,
Chairman.

COMMONWEALTH OF MASSACHUSETTS,
BOARD OF RAILROAD COMMISSIONERS,
No. 20 BEACON STREET, BOSTON, Aug. 26, 1887.

To the Superintendent of the ———— Railroad.

The Board desires to call your attention to the provisions of law in relation to brakemen on passenger trains. Section 170 of chapter 112, Public Statutes, is as follows:—

SECT. 170. Every railroad corporation shall cause a good and sufficient brake to be attached to every car used upon its railroad for the transportation of passengers, and to every car used for the transportation of freight, except four-wheeled freight cars used only for that purpose; *and shall cause to be stationed on every passenger train trusty and skilful brakemen equal in number at least to one for every two cars in the train, and one such brakeman upon the last car of every freight train, which car must always be equipped with a good and sufficient brake. For a violation of any provision of this section the corporation shall forfeit a sum not exceeding one hundred dollars.*

It is feared that since the general adoption of train brakes this law has not been strictly complied with, and in view of accidents

which have occurred (out of this State) by reason of the failure of the air-brake, the Board hereby reminds you of the necessity of fully complying with the law, and of the penalty prescribed for a violation therefor.

Per order,

WILLIAM A. CRAFTS, *Clerk.*

COMMONWEALTH OF MASSACHUSETTS,
BOARD OF RAILROAD COMMISSIONERS, Dec. 1, 1887.

To the ——— Railroad Company.

Your attention is hereby called to the provisions of section 15 of chapter 98 of the Public Statutes, relating to the observance of the Lord's day, which section was amended by section 3 of chapter 391 of the Acts of the present year, being an act to further regulate the observance of the Lord's day, and you are notified that the running of trains on the Lord's day is contrary to law, unless specially authorized by this Board.

Per order of the Board,

WILLIAM A. CRAFTS, *Clerk.*

[K.]

SUPPLEMENTARY REPORT OF GEORGE STARK
ON THE MEIGS ELEVATED RAILWAY.

To the Board of Railroad Commissioners of the State of Massachusetts.

GENTLEMEN:—In my report to you of December 23d last, on the Meigs Elevated Railway, I stated that the experimental structure submitted to my examination was, in my opinion, safe and sufficiently strong, except in the plate angle irons on the lower boom of the girder, which had proved too light and were about to be replaced with heavier ones.

These light angle irons having since been removed and heavier ones put in their place, I have again made a personal examination of the structure, and hereby report that it is now, in my opinion, safe and sufficiently strong in every particular.

Respectfully your obedient servant,

GEORGE STARK,
Civil Engineer

FEB. 15, 1887.

[L.]

EXPENSES OF OFFICE.

Rent of office,	\$2,500 00
Bridge engineer and other experts,	2,514 72
Janitor and messenger,	500 00
Bussey Bridge reports,	324 58
Furniture,	285 13
Printing blanks, circulars, etc.,	239 18
Stationery,	156 89
Copying reports, etc.,	142 55
Postage,	136 50
Type-writer and supplies,	110 60
Telephone and telegrams,	94 45
Railroad publications and newspapers,	63 00
Advertising hearings,	26 80
Gas,	22 09
Ice and watering street,	30 00
Sundry incidentals,	16 95
	<hr/>
	\$7,163 44

BOARD OF RAILROAD COMMISSIONERS.

GEORGE G. CROCKER, Boston, <i>Chairman</i> ,	Term expires July, 1888
EDWARD W. KINSLEY, Boston,	" " July, 1890
EVERETT A. STEVENS, Boston,	" " July, 1889

Clerk—WILLIAM A. CRAFTS, Boston.

Accountant—FRED E. JONES, Boston.

[M.]

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REPORTS OF THE BOARD OF RAILROAD COMMISSIONERS OF
MASSACHUSETTS

From 1870 to 1887, both inclusive.

Prepared by GEORGE G. CROCKER.

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OF

RAILWAY AND RAILROAD
RETURNS.

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Total Additions,	17	240
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Passengers,	20	242
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Cars,	47	250
Other Vehicles,	48	250
Horses,	49	250
Harnesses,	50	250

LENGTH OF ROAD.

Main Line,	51	250
Sidings,	52	250
Total Length,	53	250

MILEAGE, ETC.

Miles run,	54	252
Passengers carried,	55	252
Round trips,	56	252
Average number of Passengers per Round Trip,	57	252
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Injured,	60	252

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Repairs of Equipment,	66	254
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Per Mile operated,	68	256
Per Round Trip,	69	256
Per Mile run,	70	256
Per Passenger carried,	71	256

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Per Mile operated,	72	256
Per Round Trip,	73	256
Per Mile Run,	74	258
Per Passenger carried,	75	258

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Per Mile operated,	76	258
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REPORTS.

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* Operating the Berkshire, Stockbridge & Pittsfield and West Stockbridge Railroads.

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TABULATED COMPARATIVE RESULTS.

STOCK, DEBT AND COST PER MILE OF ROAD OWNED.

Stock paid in,	68	304
Net Debt,	69	304
Total Stock and Net Debt,	70	304
Construction,	71	304
Equipment,	72	304
Total Permanent Investments,	73	304

EARNINGS AND EXPENSES PER MILE OF ROAD OPERATED.

Total Transportation Earnings,	74	305
Operating Expenses,	75	305
Net Earnings,	76	305

EARNINGS AND EXPENSES PER TOTAL REVENUE TRAIN MILE.

Total Transportation Earnings,	77	305
Operating Expenses,	78	305
Net Earnings,	79	305

EXPENSES PER TOTAL TRAIN MILE.

Repairs of Road,	80	306
New Rails,	81	306
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ABSTRACT OF STREET RAILWAY RETURNS.

STREET RAILWAYS.		CAPITAL STOCK, DEBT, ETC.						
		1.—Capital Stock paid in.	2.—Num-ber of Stock-holders.	3.—Funded Debt.	4.—Unfunded Debt.	5.—Gross Debt.	6.—Cash and Cash Assets.	7.—Net Debt.
1	Acrushmet, ¹	\$125,000 00	56	—	\$53,424 49	\$53,424 49	\$1,507 55	\$51,916 94
2	Albany Street Freight,	50,000 00	8	—	—	—	889 21	—
3	Arlington,	25,000 00	10	—	—	—	—	—
4	Brockton,	150,000 00	75	\$100,000 00	12,179 38	112,179 38	2,427 54	109,751 84
5	Black Rocks & Salisbury R'h,	9,000 00	6	—	—	—	2,134 07	—
6	Boston & Chelsea,	121,000 00	95	—	—	—	—	—
7	Boston Consolidated,	1,700,000 00	216	1,100,000 00	498,112 00	1,598,112 00	570,857 32	1,027,254 68
8	Cambridge,	1,950,000 00	216	750,000 00	57,417 72	807,417 72	69,992 51	737,425 21
9	Citizens' ² ,	100,000 00	27	—	71,490 29	71,490 29	19,845 87	51,644 42
10	East Middlesex,	200,000 00	51	—	131,250 24	131,250 24	7,070 00	124,180 24
11	Fitchburg,	60,000 00	22	—	11,929 62	11,929 62	3,478 51	8,451 11
12	Globe,	300,000 00	105	—	19,493 16	19,493 16	11,873 41	7,619 75
13	Gloucester,	60,000 00	11	34,000 00	96 00	34,096 00	2,546 62	31,549 38
14	Haverhill & Groveland,	144,000 00	68	—	6,500 00	6,500 00	1,239 06	5,260 94
15	Holyoke,	25,000 00	45	—	24,000 00	24,000 00	1,487 01	22,512 99
16	Hoosac Valley,	50,000 00	8	50,000 00	22,449 86	72,449 86	5,023 47	77,473 33
17	Lowell,	100,000 00	95	50,000 00	10,933 00	60,933 00	21,729 87	39,203 13
18	Lowell & Draeut,	38,850 00	56	—	53,875 07	53,875 07	—	53,875 07
19	Lynn & Boston,	300,000 00	125	425,000 00	80,531 69	505,531 69	24,140 00	481,391 69
20	Malden & Melrose,	165,500 00	51	—	—	—	—	—
21	Merrimack Valley,	50,000 00	33	—	10,000 00	10,000 00	938 00	9,062 00
22	Metropolitan,	2,000,000 00	260	1,457,442 12	146,025 64	1,603,467 76	99,506 41	1,503,961 35
23	Naumkeag,	250,000 00	50	300,800 00	234,879 18	535,679 18	133,215 61	402,463 54
24	Natick & Cohituate,	25,000 00	55	—	2,404 10	2,404 10	855 37	—
25	Newton,	2,	—	—	—	—	—	—

26	New Bedford & Fairhaven. ³	135,000 00	132	—	53,859 41	3,997 28	49,862 13
27	Newburyport & Amesbury,	60,000 00	15	50,000 00	14,916 40	1,706 92	63,209 48
28	Northampton.	50,000 00	11	—	5,000 00	6 19	4,993 81
29	North Woburn.	75,000 00	60	—	1,457 58	3,626 99	—
30	Onset.	13,520 00	20	—	—	1,352 67	—
31	Pittsfield.	43,110 00	47	—	10,847 84	5,686 79	5,161 05
32	Plum Island,	40,000 00	20	9,000 00	30,000 00	3,615 70	35,384 30
33	Salem & Danvers, ⁴	100,000 00	75	—	29,720 78	668 68	29,052 10
34	Somerville.	153,000 00	120	—	—	—	—
35	South Boston.	750,000 00	111	200,000 00	404,423 95	59,810 11	344,613 84
36	Springfield,	300,000 00	83	—	8,413 08	60,480 18	—
37	Suburban,	50,000 00	16	—	—	36,000 00	—
38	Taunton,	19,000 00	120	—	8,000 00	5,483 32	2,516 68
39	Union.	260,000 00	176	—	101,067 00	4,712 72	96,354 28
40	Waltham & Newton.	30,000 00	89	—	15,400 00	1,338 26	14,061 74
41	West End,	80,000 00	15	—	15,000 00	27,457 66	—
42	Winnisimmet,	50,000 00	43	—	163 50	286 85	—
43	Worcester. ⁵	40,000 00	8	28,000 00	73,585 67	8,010 52	93,575 15
44	Worcester Consolidated,	350,000 00	31	24,000 00	160,639 77	18,719 06	165,980 71
	Total, ⁶	\$10,096,980 00	2,638	\$4,550,242 12	\$6,447,707 90	\$1,189,687 44	\$5,268,020 46

¹ Consolidated with the New Bedford & Fairhaven April 30, under the name of the Union.

² Consolidated with the Worcester May 31, under the name of the Worcester Consolidated.

³ Consolidated with the Acushnet April 30, under the name of the Union.

⁴ Purchased by the Naumkeag, and accounts merged in that company's April 19.

⁵ Consolidated with the Citizens' May 31, under the name of the Worcester Consolidated.

⁶ Acushnet, Citizens', New Bedford & Fairhaven, Salem & Danvers and Worcester Companies not included.

⁷ Chartered by special act, ch 341 of 1886. Capital to be \$50,000, all of which has been subscribed in full, but none as yet paid in.

⁸ There is a certificate issued for sixty-four shares of stock, but the company claim that it was issued without consideration and that it was signed without authority, and a suit has been commenced to test the validity of the certificate.

ABSTRACT OF STREET RAILWAY RETURNS — Continued.

STREET RAILWAYS.		COST OF ROAD, EQUIPMENT, ETC.					
		8. — Road.	9. — Equipment.	10. — Land and Buildings.	11. — Other Property.	12. — Total Permanent Investments.	13. — Total Property and Assets.
1	Acushnet,	\$86,257 62	\$52,340 36	\$23,645 30	—	\$162,243 28	\$163,750 83
2	Albany Street Freight,	49,066 29	—	—	—	49,066 29	49,955 50
3	Arlington,	25,000 00	—	—	—	25,000 00	25,000 00
4	Brockton,	169,242 80	48,183 64	36,815 48	—	254,241 42	256,668 96
5	Black Rocks & Salisbury Beach,	5,866 33	2,400 00	380 00	—	8,646 33	10,780 40
6	Boston & Chelsea,	121,000 00	—	—	—	121,000 00	121,000 00
7	Boston Consolidated,	1,157,132 77	762,772 15	882,824 03	\$111,963 90	2,914,692 85	3,485,550 17
8	Cambridge,	1,374,387 81	633,682 57	726,688 21	—	2,734,758 09	2,804,750 60
9	Citizens',	96,622 95	39,322 62	16,127 64	—	152,073 21	171,919 08
10	East Middlesex,	212,422 94	73,757 77	57,066 77	—	343,247 48	350,317 48
11	Fitchburg,	53,732 66	14,442 42	5,557 78	—	73,732 86	77,211 37
12	Globe,	205,118 48	64,757 00	57,538 13	—	327,413 61	339,287 02
13	Gloucester,	44,191 81	27,949 95	17,338 04	—	89,479 80	92,026 42
14	Haverhill & Groveland,	73,404 33	44,569 76	26,050 69	—	144,024 78	145,263 84
15	Holyoke,	28,926 44	21,418 14	820 46	—	50,265 04	51,752 05
16	Hoosac Valley,	94,217 15	13,914 00	7,100 00	—	115,231 15	120,254 62
17	Lowell,	115,911 43	48,110 91	32,020 26	—	196,042 60	217,772 47
18	Lowell & Dracut,	62,388 56	25,172 45	7,236 32	1,000 00	95,997 33	95,997 33
19	Lynn & Boston,	480,670 81	202,718 12	151,655 67	—	835,044 60	859,181 60
20	Malden & Melrose,	165,500 00	—	—	—	165,500 00	165,500 00
21	Merrimack Valley,	30,000 00	18,500 00	35,600 00	—	84,100 00	85,038 00
22	Metropolitan,	1,742,421 23	1,035,511 75	1,217,998 52	350,000 00	4,345,931 50	4,445,457 91
23	Naumkeag,	473,802 48	122,425 91	90,820 13	—	687,048 52	820,261 16
24	Natick & Cohituate,	21,550 00	6,900 00	4,000 00	—	32,450 00	33,305 37
25	Newton,	—	—	—	—	—	—

26	New Bedford & Fairhaven,	114,668 80	50,869 53	45,165 12	—	210,703 45	214,700 73
27	Newburyport & Amesbury,	80,761 43	29,325 85	19,781 69	—	129,868 97	131,575 89
28	Northampton,	36,000 00	9,117 50	4,709 00	—	49,817 50	49,823 69
29	North Woburn,	51,427 70	14,451 95	9,637 74	—	75,517 39	79,144 38
30	Onset,	6,189 34	6,896 30	356 82	—	13,442 46	14,795 13
31	Pittsfield,	28,228 02	13,329 35	5,497 45	—	47,051 82	52,741 61
32	Plum Island,	53,653 58	8,290 18	18,959 75	—	80,903 51	84,519 21
33	Salem & Danvers,	64,072 55	43,567 68	24,090 65	—	131,730 88	132,399 56
34	Somerville,	153,000 00	—	—	—	153,000 00	153,000 00
35	South Boston,	302,738 14	350,432 84	363,493 61	10,000 00	1,026,664 59	1,086,474 70
36	Springfield,	152,735 54	67,919 87	97,852 10	—	318,507 51	378,987 69
37	Suburban,	14,000 00	—	—	—	14,000 00	50,000 00
38	Taunton,	50,732 43	29,686 62	8,439 93	—	88,858 98	94,342 30
39	Union,	203,056 11	95,092 76	68,943 62	—	369,092 49	373,805 21
40	Waltham & Newton,	37,493 41	9,361 87	3,448 88	—	50,304 16	51,642 42
41	West End,	60,800 61	6,741 73	—	—	67,542 34	95,000 00
42	Winnisimmet,	50,000 00	—	—	—	50,000 00	50,286 85
43	Worcester,	106,438 86	54,123 01	47,323 78	—	207,885 65	215,896 17
44	Worcester Consolidated,	294,263 92	109,414 28	123,734 12	—	527,412 32	546,131 38
Total, ¹		\$8,285,333 55	\$3,917,247 64	\$4,082,356 20	\$472,963 90	\$16,757,901 29	\$17,947,588 73

¹ Acushnet, Citizens', New Bedford & Fairhaven, Salem & Danvers and Worcester Companies not included

ABSTRACT OF STREET RAILWAY RETURNS — Continued.

STREET RAILWAYS.		PROPERTY ACCOUNTS: ADDITIONS AND REDUCTIONS DURING THE YEAR.				
		14. — Construction.	15. — Equipment.	16. — Other Property.	17. — Total Additions.	18. — Reductions.
						19. — Net Additions.
1	Acushnet, ¹	\$15,544 15	\$2,009 16	\$3,375 78	\$20,929 09	\$20,929 09
2	Albany Street Freight,	—	—	—	—	—
3	Arlington,	11,400 00	—	—	11,400 00	11,400 00
4	Brookton,	3,049 80	3,380 76	3,274 07	9,704 63	8,304 63
5	Black Rocks & Salisbury Beach,	—	—	—	—	—
6	Boston & Chelsea,	—	—	—	—	—
7	Boston Consolidated,	122,942 00	86,179 53	66,825 61	275,947 14	207,090 44
8	Cambridge,	—	1,611 67	6,458 51	8,070 18	8,070 18*
9	Citizens, ²	1,180 87	9,988 79	1,377 76	12,547 42	12,547 42
10	East Middlesex,	178,822 94	64,467 91	52,007 94	295,298 79	294,828 79
11	Fitchburg,	4,130 39	6,069 23	1,272 20	11,471 82	8,520 91
12	Globe,	15,876 17	15,276 69	18,644 26	49,797 12	45,177 43
13	Gloucester,	7,280 97	2,656 75	1,362 98	11,300 70	8,028 00
14	Glaverhill & Groveland,	2,882 88	5,088 63	2,431 69	10,403 20	10,160 75
15	Holyoke,	4,606 25	6,054 05	244 26	10,904 56	10,904 56
16	Hoosac Valley,	20,256 84	1,060 00	3,000 00	24,316 84	21,706 84
17	Lowell,	37,423 02	21,824 20	6,268 32	65,515 54	65,515 54
18	Lowell & Draent,	61,033 88	25,172 45	8,236 32	94,442 65	94,442 65
19	Lynn & Boston,	33,289 15	17,633 33	13,814 98	64,737 46	64,727 46
20	Malden & Melrose,	90,780 48	—	—	90,780 48	90,780 48
21	Merrimack Valley,	10,000 00	10,500 00	5,600 00	26,100 00	26,100 00
22	Metropolitan,	98,890 38	74,395 00	78,189 51	251,474 89	251,474 89
23	Naumkeag,	226,415 51	8,123 57	38,722 58	273,261 46	271,886 46
24	Natick & Cohituate,	—	87 50	—	87 50	1,876 00
25	Newton,	—	—	—	—	—

26	New Bedford & Fairhaven, ³	3,143 72	970 00	5,876 08	9,989 80	—	9,989 80
27	Newburyport & Amesbury,	—	6,144 00	8,931 69	15,075 69	250 00	14,825 69
28	Northampton,	—	1,190 00	325 00	1,515 00	—	1,515 00
29	North Woburn,	115 75	6,199 29	1,212 09	7,527 15	85 00	7,442 15
30	Onset,	150 00	147 88	6 29	304 17	—	304 17
31	Pittsfield,	5,194 34	884 00	—	6,078 34	—	6,078 34
32	Plum Island,	53,653 58	8,290 18	18,959 75	80,903 51	—	80,903 51
33	Salem & Danvers, ⁴	2,812 14	161 46	—	2,973 60	—	2,973 60
34	Somerville,	—	—	—	—	—	—
35	South Boston,	—	50,706 10	13,737 67	64,443 77	8,919 30	55,524 47
36	Springfield,	49,576 14	21,346 81	19,898 97	90,821 92	—	90,821 92
37	Suburban,	14,000 00	—	—	14,000 00	—	14,000 00 ⁵
38	Taunton,	28,732 43	15,686 62	1,439 93	45,858 98	—	45,858 98
39	Union, ⁶	4,129 69	1,218 00	133 20	5,480 89	9,335 13	3,834 24 ⁷
40	Waltham & Newton,	—	637 50	—	637 50	—	637 50
41	West End,	60,800 61	6,741 73	—	67,542 34	—	67,542 34 ⁸
42	Winnisimmet,	—	—	—	—	—	—
43	Worcester, ²	1,757 98	6,304 06	4,364 05	12,426 09	—	12,426 09
44	Worcester Consolidated, ⁶	197,640 97	70,091 66	107,606 48	375,339 11	—	375,339 11

¹ From Oct. 1, 1886, to April 30, 1887.² From Oct. 1, 1886, to May 31, 1887.³ From Oct. 1, 1886, to April 30, 1887.⁴ From Oct. 1, 1886, to April 19, 1887.⁵ From May 1, 1887, to Sept. 30, 1887.⁶ From June 1, 1887, to Sept. 30, 1887.⁷ Reduction.⁸ Under construction.

* See memoranda on page 260

ABSTRACT OF STREET RAILWAY RETURNS — Continued.

STREET RAILWAYS.		REVENUE FOR THE YEAR.				
		20. — Passengers.	21. — Rents.	22. — Mail and Express.	23. — Sales of Manure.	24. — Other Sources.
						25. — Total Income.
1	Acushnet, ¹	\$21,036 46	—	—	\$177 47	\$100 00
2	Albany Street Freight,	7 —	—	—	—	1,623 00
3	Arlington,	8 —	\$816 00	—	—	816 00
4	Brookton,	68,308 51	—	—	592 50	177 50
5	Black Rocks & Salisbury Beach,	5,945 09	—	—	—	—
6	Boston & Chelsea,	1,094,410 26	7,260 00	—	—	3,025 00
7	Boston Consolidated,	788,874 18	10,631 05	—	7,271 08	3,903 75
8	Cambridge,	87,288 05	1,923 31	—	8,311 01	—
9	Citizens', ²	21,784 16	—	\$240 00	44 46	—
10	East Middlesex,	23,077 35	—	—	309 02	298 10
11	Fitchburg,	120,970 76	—	—	162 11	192 30
12	Globe,	32,286 84	—	—	1,316 65	76 10
13	Gloucester,	51,422 97	—	—	300 50	787 25
14	Haverhill & Groveland,	25,460 41	—	—	543 50	697 50
15	Holyoke,	17,395 76	—	—	274 87	203 40
16	Hoosac Valley,	97,634 04	—	94 08	148 16	138 71
17	Lowell,	10,028 49	—	—	1,225 00	2,172 01
18	Lowell & Dracut,	457,234 02	780 52	—	3,127 04	1,500 00
19	Lynn & Boston,	56,726 61	—	—	—	—
20	Malden & Melrose,	2,113,131 56	—	—	500 00	200 00
21	Merrimack Valley,	179,464 81	39,940 34	—	8,316 05	38,860 07
22	Metropolitan,	13,718 19	665 79	—	2,099 01	432 35
23	Naumkeag,	—	—	362 55	160 00	157 35
24	Natick & Cohituate,	—	—	—	—	—
25	Newton,	—	—	—	—	—

26	New Bedford & Fairhaven, ³	36,807 09	—	361 00	1,212 81	200 00	38,580 90
27	Newburyport & Amesbury,	31,381 85	—	—	353 61	948 64	32,684 10
28	Northampton,	14,302 03	—	214 00	200 00	—	14,716 03
29	North Woburn,	11,847 89	13 69	119 79	184 56	498 16	12,664 09
30	Onset,	2,935 28	—	48 40	—	379 94	3,363 62
31	Pittsfield,	15,347 24	—	—	200 00	—	15,547 24
32	Plum Island,	8,262 90	—	—	—	1,267 50	9,530 40
33	Salem & Danvers, ⁴	20,780 19	—	—	379 17	144 00	21,303 36
34	Somerville, ⁵	—	9,180 00	—	—	—	9,180 00
35	South Boston,	539,439 84	2,294 77	—	1,622 83	2,975 17	546,332 61
36	Springfield,	109,957 08	—	—	726 11	5,714 62	116,397 81
37	Suburban,	—	—	—	—	—	—
38	Taunton,	32,917 96	—	—	—	—	32,917 96
39	Union, ⁶	62,564 21	—	78 50	506 42	171 37	63,320 50
40	Waltham & Newton,	12,962 22	—	50 00	100 00	—	13,112 22
41	West End,	—	—	—	—	—	—
42	Winnisimmet,	—	3,000 00	—	—	—	3,000 00
43	Worcester, ²	59,357 74	1,615 05	—	632 73	473 25	62,078 77
44	Worcester Consolidated, ⁶	69,604 53	—	—	733 69	731 99	71,070 21
Total,		\$6,269,666 57	\$78,120 52	\$1,568 32	\$42,030 36	\$68,139 03	\$6,459,524 80

¹ From Oct. 1, 1886, to April 30, 1887.² From Oct. 1, 1886, to May 31, 1887.³ From Oct. 1, 1886, to April 30, 1887.⁴ From Oct. 1, 1886, to April 19, 1887.⁵ From May 1, 1887, to Sept. 30, 1887.⁶ From June 1, 1887, to Sept. 30, 1887.⁷ Used only for freight.⁸ Leased to and operated by the Cambridge.⁹ Leased to and operated by the Lynn & Boston.¹⁰ Leased to and operated by the Boston Consolidated.¹¹ Road not completed and not in operation.

ABSTRACT OF STREET RAILWAY RETURNS — Continued.

	STREET RAILWAYS.	EXPENSES FOR THE YEAR.						32.—Provender.
		26.—Repairs of Road-bed and Track.	27.—Repairs of Equipment.	28.—Repairs of Buildings.	29.—Renewal of Horses.	30.—Salaries, etc., General Office.	31.—Wages, etc., Employés.	
1	Aenshnet, ¹	\$244 75	\$2,895 74	—	—	\$2,024 90	\$15,169 35	\$9,597 46
2	Albany Street Freight,	47 22	—	—	—	150 00	—	—
3	Arlington,	—	—	—	—	—	—	—
4	Brookton,	1,885 38	3,458 84	\$96 63	\$1,067 00	5,470 18	26,006 73	14,926 29
5	Black Rocks & Salisbury B'h.,	275 35	368 29	—	—	2,297 93	1,046 58	248 907
6	Boston & Chelsea.	—	—	—	—	—	—	—
7	Boston Consolidated,	13,680 90	73,463 12	6,365 65	46,706 00	26,776 00	465,848 68	172,854 43
8	Cambridge,	27,277 16	71,002 56	10,104 48	34,060 70	18,549 95	333,120 90	117,512 60
9	Citizens', ²	38 90	2,744 73	92 65	582 50	2,042 00	13,187 80	8,412 24
10	East Middlesex,	2,062 72	1,283 91	98 51	520 00	1,818 12	9,107 30	4,463 18
11	Fitchburg,	678 06	1,075 20	124 30	—	1,904 19	8,154 02	3,745 70
12	Globe,	3,843 11	8,035 92	951 26	3,120 12	5,500 00	42,824 00	17,640 53
13	Gloucester,	1,630 51	2,284 87	—	—	1,577 49	15,234 73	7,699 83
14	Haverhill & Groveland,	4,580 74	5,750 21	652 21	1,390 75	2,350 00	22,597 71	13,030 49
15	Holyoke,	1,598 70	1,968 98	180 34	545 00	1,175 00	10,505 27	5,650 99
16	Hoosac Valley,	2,332 63	927 96	—	—	—	6,819 83	3,811 34
17	Lowell,	7,586 32	7,135 94	1,157 29	1,685 16	4,099 90	41,046 65	13,128 86
18	Lowell & Dracut,	—	42 54	—	—	700 00	4,470 09	698 12
19	Lynn & Boston,	30,018 99	42,533 61	2,932 34	17,592 00	11,498 61	182,500 92	59,700 39
20	Malden & Melrose,	—	—	—	—	—	—	—
21	Merrimack Valley.	2,569 72	5,054 01	331 78	1,740 00	2,000 00	18,862 73	7,564 09
22	Metropolitan,	60,946 03	164,441 75	49,299 58	78,620 00	27,849 90	959,659 67	288,686 68
23	Naumkeag,	4,079 51	9,701 35	515 32	6,000 50	6,822 94	65,700 42	30,623 97
24	Natick & Cohituate,	1,560 76	—	—	215 00	1,100 00	3,337 79	2,146 56
25	Newton,	—	—	—	—	—	—	—

26	New Bedford & Fairhaven, ³	1,920 31	3,481 34	246 02	—	1,936 69	20,190 39	11,347 70
27	Newburyport & Amesbury,	12,541 17	1,766 17	15 83	—	635 57	11,410 92	6,146 49
28	Northampton, . . .	1,958 94	1,426 39	132 04	773 75	1,000 00	3,571 25	2,418 28
29	North Woburn, . . .	784 83	445 56	32 95	239 00	977 87	4,231 13	1,886 57
30	Onset, . . .	264 79	143 87	—	—	150 00	1,501 73	191 29 ⁷
31	Pittsfield, . . .	1,025 00	757 67	163 74	750 00	2,560 00	7,465 76	4,495 94
32	Plum Island, . . .	—	—	—	—	—	2,469 53	460 61
33	Salem & Danvers, ⁴	100 55	1,105 09	59 53	—	1,234 94	10,530 23	3,930 90
34	Somerville, . . .	—	—	—	—	—	—	—
35	South Boston, . . .	25,160 85	40,852 07	2,974 90	30,054 07	9,264 44	216,678 22	80,443 38
36	Springfield, . . .	4,906 61	9,191 37	519 64	3,132 50	5,760 00	37,203 43	18,663 00
37	Suburban, . . .	—	—	—	—	—	—	—
38	Taunton, . . .	2,542 05	3,814 17	—	352 25	1,700 00	9,178 23	6,408 94
39	Union, ⁵ . . .	2,039 21	4,538 58	129 16	—	1,779 86	24,253 35	11,985 74
40	Waltham & Newton, . . .	1,068 43	379 87	—	—	945 00	4,322 34	2,150 13
41	West End, . . .	—	—	—	—	—	—	—
42	Winnisimmet, . . .	—	—	—	—	—	—	—
43	Worcester, ² . . .	4,745 04	5,436 45	885 52	1,044 16	2,929 17	19,203 98	10,936 55
44	Worcester Consolidated, ⁶	2,617 11	5,223 12	1,005 71	4,091 75	2,226 00	20,771 74	8,657 77
	Total, . . .	\$228,612 35	\$482,731 25	\$79,067 38	\$234,302 21	\$158,806 65	\$2,638,183 40	\$852,265 94

¹ From Oct. 1, 1886, to April 30, 1887.² From Oct. 1, 1886, to May 31, 1887.³ From Oct. 1, 1886, to April 30, 1887.⁴ From Oct. 1, 1886, to April 19, 1887.⁵ From May 1, 1887, to Sept. 30, 1887.⁶ From June 1, 1887, to Sept. 30, 1887.⁷ Coal, wood and water for dummy engine.

ABSTRACT OF STREET RAILWAY RETURNS — Continued.

STREET RAILWAYS.		EXPENSES FOR THE YEAR — Concluded.						
		33.—Taxes.	34.—Rents.	35.—Insurance.	36.—Injuries to Persons and Property.	37.—Other Expenses.	38.—Total Expenses.	39.—Percentage Expenses to Earnings.
1	Acushnet, ¹	\$921 36	—	—	—	\$6,957 65	\$37,811 21	175
2	Albany Street Freight,	164 80	—	—	—	1,092 62	1,454 64	—
3	Arlington,	—	—	—	—	—	—	—
4	Brockton.	5,328 97	—	\$1,159 20	\$4,803 16	3,488 01	67,690 39	98
5	Black Rocks & Salisbury Beach,	139 60	\$455 00	—	—	507 47	5,339 12	—
6	Boston & Chelsea,	—	—	—	—	—	—	—
7	Boston Consolidated,	27,707 55	1,669 04	6,737 16	20,227 34	68,594 17	930,630 04	83
8	Cambridge,	37,698 28	13,283 15	4,046 28	14,925 90	31,369 22	712,951 18	89
9	Citizens, ²	23 44	1,580 00	340 64	—	6,693 79	35,738 69	96
10	East Middlesex,	623 27	43 54	427 63	5 50	2,840 64	23,294 32	91
11	Fitchburg,	171 97	—	148 00	871 40	2,309 50	19,182 34	75
12	Globe,	5,981 62	—	2,460 85	812 05	8,138 11	99,307 57	88
13	Gloucester,	1,039 59	—	229 12	19 00	2,378 70	32,093 84	96
14	Haverhill & Groveland,	469 24	—	262 42	10 25	3,071 84	54,165 86	103
15	Holyoke,	299 73	—	134 98	—	1,386 67	23,445 66	90
16	Hoosac Valley,	126 91	—	178 25	128 00	1,365 03	15,689 95	88
17	Lowell,	1,764 12	—	891 83	220 00	6,832 01	85,548 08	84
18	Lowell & Dracont,	—	—	369 48	10 00	466 00	6,756 23	67
19	Lynn & Boston,	6,982 20	23,271 32	3,105 39	5,032 92	22,479 21	407,647 90	88
20	Malden & Melrose,	—	—	—	—	—	—	—
21	Merrimack Valley,	1,263 52	—	1,094 33	751 29	1,166 27	42,397 74	74
22	Metropolitan,	70,562 10	7,410 22	12,939 21	35,731 38	105,283 69	1,861,430 21	85
23	Naumkeag,	2,587 77	325 60	2,173 79	3,029 75	7,496 29	139,057 21	76
24	Natick & Cochituate,	380 92	—	98 02	—	417 00	9,256 05	64
25	Newton,	—	—	—	—	—	—	—

26	New Bedford & Fairhaven, ³	1,337 95	—	70 25	623 00	2,878 91	44,032 56	114
27	Newburyport & Amesbury,	260 40	—	670 99	272 61	6,117 19	39,837 34	122
28	Northampton,	67 39	—	114 00	—	1,395 62	12,857 66	88
29	North Woburn,	510 75	—	303 13	45 85	1,005 06	10,482 70	83
30	Onset,	—	—	67 52	—	1 00	2,320 20	—
31	Pittsfield,	153 20	—	231 48	—	999 88	18,602 67	119
32	Plum Island,	—	—	127 50	—	953 55	4,011 19	—
33	Salem & Danvers, ⁴	292 47	239 66	375 97	—	1,853 36	19,722 70	93
34	Somerville,	—	—	—	—	—	—	—
35	South Boston,	19,925 46	10,990 43	3,005 64	25,688 97	31,403 52	496,441 95	91
36	Springfield,	3,610 32	—	456 83	801 00	1,831 56	86,076 26	74
37	Suburban,	—	—	—	—	—	—	—
38	Taunton,	903 22	—	425 27	—	3,153 71	28,477 84	87
39	Union, ⁵	577 68	—	1,164 31	31 31	2,804 53	49,303 73	78
40	Waltham & Newton,	38 88	—	101 00	—	2,388 33	11,393 98	87
41	West End,	—	—	—	—	—	—	—
42	Winnisimmet,	—	—	—	—	—	—	—
43	Worcester, ²	1,254 48	—	565 00	5 00	7,782 18	54,787 53	88
44	Worcester Consolidated, ³	3,142 50	77 78	7 50	240 98	3,065 57	51,127 53	72
	Total,	\$196,311 66	\$59,345 74	\$44,482 97	\$114,286 66	\$351,967 86	\$5,540,364 07	86

¹ From Oct. 1, 1886, to April 30, 1887.² From Oct. 1, 1886, to May 31, 1887.³ From Oct. 1, 1886, to April 30, 1887.⁴ From Oct. 1, 1886, to April 19, 1887.⁵ From May 1, 1887, to Sept. 30, 1887.⁶ From June 1, 1887, to Sept. 30, 1887.

ABSTRACT OF STREET RAILWAY RETURNS — Continued.

STREET RAILWAYS.		NET INCOME, INTEREST, DIVIDENDS, ETC.					
		40. — Net Income.	41. — Interest Accrued.	42. — Dividends Declared.	43. — Per Cent.	44. — Balance for the Year.	45. — Surplus last Year
						46. — Surplus Sept. 30, 188	
1	Aeushnet,	\$16,197 28 ¹	\$125 00	—	—	7516,322 28 ¹	7514,673 66 ¹
2	Albany Street Freight,	168 36	—	—	—	168 36	44 50 ¹
3	Arlington,	816 00	—	\$816 00	6	—	—
4	Brockton,	1,388 12	7,144 70	9,000 00	6	14,756 58 ¹	5,510 42 ¹
5	Black Rocks & Salisbury Beach,	605 97	—	900 00	10	294 03 ¹	1,780 40
6	Boston & Chelsea,	7,260 00	—	7,260 00	6	—	—
7	Boston Consolidated,	184,707 35	70,885 22	136,000 00	8	22,177 87 ¹	187,438 17
8	Cambridge,	90,151 07	37,506 08	48,750 00	21 ²	3,894 99	47,332 88
9	Citizens',	1,593 82	1,228 08	3,000 00	3 ¹	2,634 26 ¹	428 79
10	East Middlesex,	2,336 96	—	990 00	3	1,346 96	19,067 24
11	Fitchburg,	6,249 42	122 56	2,400 00	4	3,726 86	5,281 75
12	Globe,	23,055 94	1,060 54	17,500 00	61 ²	4,495 40	19,793 86
13	Gloucester,	1,280 75	1,194 57	1,800 00	3 ³	1,713 82 ¹	2,069 58 ¹
14	Haverhill & Groveland,	1,501 89 ¹	1,477 76	—	—	2,979 65 ¹	5,236 16 ¹
15	Holyoke,	2,493 02	489 14	1,000 00	4	1,003 88	2,752 05
16	Hoosac Valley,	2,086 76	4,282 00	—	—	2,195 24 ¹	2,195 24 ¹
17	Lowell,	15,482 97	583 90	5,994 00	6	8,905 07 ¹	56,839 47
18	Lowell & Dracut,	3,272 26	—	—	—	3,272 26	3,272 26
19	Lynn & Boston,	54,993 68	22,670 50	24,000 00	8	8,323 18	53,652 91
20	Malden & Melrose,	—	—	—	—	—	—
21	Merrimack Valley,	15,028 87	—	3,000 00	6	12,028 87	25,038 00
22	Metropolitan,	338,817 81	69,500 00	200,000 00	10	69,317 81	841,970 15
23	Naumkeag,	43,604 75	18,956 97	24,100 00	— ²¹	547 78	34,584 98
24	Natick & Cohasset,	5,142 04	215 29	1,500 00	6	3,426 75	5,901 27
25	Newton,	—	—	—	—	—	—

26	New Bedford & Fairhaven,	5,451 66 ¹	913 70	4,050 00	3	⁹ 10,415 36 ¹	36,256 68	⁹² 5,841 32
27	Newburyport & Amesbury,	7,153 24 ¹	2,478 26	—	—	9,631 50 ¹	16,290 99	6,659 49
28	Northampton,	1,858 37	—	—	—	1,858 37	7,034 68 ¹	5,176 31 ¹
29	North Woburn,	2,181 39	—	—	—	2,181 39	505 41	2,686 80
30	Onset,	1,043 42	—	780 00	6	263 42	1,011 71	1,275 13
31	Pittsfield,	3,055 43 ¹	—	—	—	3,055 43 ¹	1,839 20	1,216 23 ¹
32	Plum Island,	5,519 21	—	—	—	5,519 21	—	5,519 21
33	Salem & Danvers,	1,580 66	824 50	—	—	¹⁰ 756 16	1,922 62	¹⁰² 678 78
34	Somerville,	9,180 00	—	9,180 00	6	—	—	—
35	South Boston,	49,890 66	19,603 17	—	—	30,287 49	¹⁰⁸ 8,236 74 ¹	67,949 25 ¹
36	Springfield,	30,321 55	606 67	13,000 00	8 ⁵	16,714 88	53,859 73	70,574 61
37	Suburban,	—	—	—	—	—	—	—
38	Taunton,	4,440 12	200 00	2,400 00	6 ⁸	1,840 12	5,502 18	7,342 30
39	Union,	14,016 77	2,979 32	—	—	11,037 45	²⁰ 1,700 76	12,738 21
40	Waltham & Newton,	1,718 24	—	—	—	1,718 24	4,524 18	6,242 42
41	West End,	—	—	—	—	—	—	—
42	Winnisimmet,	3,000 00	—	3,000 00	6	¹³ 3,545 62	123 35	123 35
43	Worcester,	7,291 24	3,745 62	—	—	¹²⁷ 4,57 20	70,764 88	¹¹⁷ 4,310 50
44	Worcester Consolidated,	19,942 68	1,985 48	10,500 00	3	—	3,974 41	¹²¹ 1,431 61
	Total,	\$919,160 73	\$270,779 03	\$530,920 00	5.26	\$117,461 70	\$1,311,024 86	\$1,402,900 83

¹ Deficit.

² Two per cent. on \$200,000; 4½ per cent. on \$300,000 capital stock.

³ On \$33,000 capital stock.

⁴ Six per cent. on \$13,000 of capital stock.

⁵ Four per cent. on \$150,000 Jan. 1, 1887, and 4 per cent. on \$175,000 capital stock July 1, 1887.

⁶ On \$40,000 of capital stock.

⁷ From Oct. 1, 1886, to April 19, 1887.

⁸ From Oct. 1, 1886, to May 31, 1887.

⁹ From June 1, 1887, to Sept 30, 1887.

¹⁰ From Oct. 1, 1886, to April 30, 1887.

¹¹ From Oct. 1, 1886, to April 30, 1887.

¹² From May 1, 1887, to Sept. 30, 1887.

¹³ \$1,610.91 deducted for depreciation in property accounts.

¹⁴ \$4,619.69 deducted for depreciation in property accounts.

¹⁵ \$2,854 deducted for depreciation in property accounts.

¹⁶ Surplus Sept. 30, 1886, \$1,563.49 less depreciation charge in 1887 of \$3,820.

¹⁷ \$4,250 added for premium on bonds sold.

¹⁸ \$1,638 deducted for depreciation in property accounts.

¹⁹ Surplus, as stated, \$69,959 19

Deduct Reed defalcation, \$266,866 18

Less amount realized on bond, 10,000 09

Expense of strike, \$216,866 18

Depreciation on horses, 10,302 73

2,212 50

229,381 41

Balance, \$159,422 22

Less correction of fraudulent entries made by former treasurer, 61,185 48

Deficit, \$98,236 74

²⁰ \$9,466.90 deducted for equalization of stock and revaluation of horses.

²¹ Six per cent. on \$250,000, and 13 per cent. on \$70,000 capital stock.

ABSTRACT OF STREET RAILWAY RETURNS — Continued.

	STREET RAILWAYS	EQUIPMENT.				LENGTH OF ROAD.		
		47.—Cars.	48.—Other Vehicles.	49.—Horses.	50.—Harnesses.	51.—Main Line.	52. Sidings.	53.—Total Length.
1	Aeushnet, ¹	38	—	146	30	7,125	.868	7,993
2	Albany Street Freight,	—	—	—	—	.856	.076	.932
3	Arlington,	—	—	—	—	1,576	—	1,576
4	Brockton,	32	3	141	33	10,366	.896	11,462
5	Black Rocks & Salisbury Beach,	5	—	9	—	1,694	.095	1,789
6	Boston & Chelsea,	—	—	—	—	4,116	.038	4,154
7	Boston Consolidated,	400	11	1,955	488	45,245	3,563	48,808
8	Cambridge,	327	19	1,684	522	54,328	2,461	56,789
9	Citizens',	23	—	118	12	6,595	.632	7,227
10	East Middlesex,	57	3	158	52	14,916	.864	15,780
11	Fitchburg,	9	—	43	16	4,109	.163	4,272
12	Globe,	61	5	230	60	13,127	3,270	16,397
13	Gloucester,	13	—	76	45	4,140	.370	4,510
14	Haverhill & Groveland,	38	5	106	50	12,558	1,306	13,864
15	Holyoke,	15	—	54	13	3,580	.829	4,409
16	Hoosac Valley,	8	2	31	16	5,953	.211	6,164
17	Lowell,	46	7	189	36	10,998	1,084	12,082
18	Lowell & Dracut,	16	—	78	20	8,172	.341	8,513
19	Lynn & Boston,	195	8	791	230	42,599	2,709	45,308
20	Malden & Melrose,	—	—	—	—	6,287	.473	6,760
21	Merrimack Valley,	27	—	106	20	7,550	.900	8,450
22	Metropolitan,	764	20	3,720	1,046	85,290	7,522	92,812
23	Naukeag,	107	23	362	150	30,860	3,749	34,609
24	Natick & Cohituate,	7	5	19	5	3,000	.200	3,200
25	Newton,	—	—	—	—	—	—	—

26	New Bedford & Fairhaven, ³	46	3	157	39	9,277	.816	10,093
27	Newburyport & Amesbury,	16	4	58	28	6,600	.200	6,800
28	Northampton.	9	3	33	5	3,200	.030	3,230
29	North Woburn,	13	2	28	9	4,720	.100	4,820
30	Onset,	6	—	10	—	1,300	.125	1,425
31	Pittsfield,	8	—	40	16	3,300	.320	3,620
32	Plum Island,	10	1	11	8	5,200	.400	5,600
33	Salem & Danvers, ⁴	24	2	117	30	9,027	.480	9,507
34	Somerville,	—	—	—	—	4,879	.526	5,405
35	South Boston,	226	—	1,087	320	13,015	.205	13,220
36	Springfield,	46	10	198	45	13,430	.310	13,740
37	Suburban,	—	—	—	—	—	—	—
38	Taunton,	23	4	83	24	7,000	.335	7,335
39	Union, ⁵	82	3	276	64	16,402	1.684	18,086
40	Waltham & Newton,	8	5	20	6	3,211	.190	3,401
41	West End,	8	—	—	—	—	—	—
42	Winnisimmet,	—	—	—	—	1,883	.073	1,956
43	Worcester, ²	31	—	159	30	6,631	.372	7,003
44	Worcester Consolidated, ⁶	58	5	297	44	14,611	1.196	15,807
	Total, ⁷	2,633	148	11,874	3,371	470,271	36,814	507,085

¹ From Oct. 1, 1886, to April 19, 1887.² From Oct. 1, 1886, to May 31, 1887.³ From June 1, 1887, to Sept. 30, 1887.⁴ From Oct. 1, 1886, to April 30, 1887.⁵ From Oct. 1, 1886, to April 30, 1887.⁶ From May 1, 1887, to Sept. 30, 1887.⁷ Acushnet, Citizens', New Bedford & Fairhaven, Salem & Danvers and Worcester Companies not included.⁸ One electric motor car in process of construction.⁹ One dummy engine.¹⁰ Two Baldwin Noiseless Street-Car Motors.

ABSTRACT OF STREET RAILWAY RETURNS — Continued.

	STREET RAILWAYS	MILEAGE, ETC.				ACCIDENTS.	
		54. — Miles run.	55. — Passengers Carried.	56. — Round Trips.	57. — Average No. of Passengers per Round Trip	58. — Persons Employed.	59. — Fatal. 60. — Injured.
1	Aushnet, ¹	155,860	418,334	27,471	15	49	—
2	Albany Street Freight,	—	—	—	—	—	—
3	Arlington,	—	—	—	—	—	—
4	Brockton,	271,620	1,218,932	21,621	56	48	1
5	Black Rocks & Salisbury B'h,	4,850	71,700	1,280	—	7	—
6	Boston & Chelsea,	—	—	—	—	—	—
7	Boston Consolidated,	3,352,058	22,834,215	398,200	57	943	14
8	Cambridge,	2,663,502	14,918,663	323,618	46	600	12
9	Citizens, ²	136,827	771,303	29,803	26	46	—
10	East Middlesex,	86,992	347,297	15,984	22	53	—
11	Fitchburg,	84,918	418,707	17,625	24	23	12
12	Globe,	414,288	2,470,783	100,769	24	82	2
13	Gloucester,	123,685	611,122	20,324	30	32	—
14	Haverhill & Groveland,	174,381	829,294	30,071	27	38	—
15	Holyoke,	101,299	491,905	22,123	22	24	—
16	Hoosac Valley,	70,080	347,294	5,840	59	13	1
17	Lowell,	311,049	1,994,565	311,049	64	90	—
18	Lowell & Dracut,	60,000	187,180	13,726	14	40	—
19	Lynn & Boston,	1,422,884	8,671,119	164,016	53	327	10
20	Malden & Melrose,	—	—	—	—	—	—
21	Merrimack Valley,	212,262	992,543	47,450	21	45	1
22	Metropolitan,	7,081,634	42,970,289	1,101,407	39	1,733	50
23	Naukeag,	488,686	3,365,846	79,121	43	150	7
24	Natick & Cohituate,	39,918	226,980	6,653	34	7	—
25	Newton,	—	—	—	—	—	—

26	New Bedford & Fairhaven, ³	222,259	749,363	51,792	15	50	—	2
27	Newburyport & Amesbury,	98,721	479,752	7,491	64	27	—	—
28	Northampton,	46,520	184,485	7,269	25	10	—	—
29	North Woburn,	45,285	226,362	8,881	25	10	—	—
30	Onset,	2,998	32,231	1,489	—	7	—	—
31	Pittsfield,	40,840	310,640	6,805	45	15	—	—
32	Plum Island,	22,600	117,140	2,260	—	10	—	—
33	Salem & Danvers, ⁴	116,352	334,864	9,600	35	37	—	—
34	Somerville,	—	—	—	—	—	—	—
35	South Boston,	1,606,057	11,085,052	243,183	46	435	—	7
36	Springfield,	372,656	2,135,016	77,943	27	92	1	3
37	Suburban,	—	—	—	—	—	—	—
38	Taunton,	130,790	685,501	33,111	27	28	—	—
39	Union, ⁵	244,484	1,344,693	55,874	24	103	—	1
40	Waltham & Newton,	38,333	256,939	5,969	43	8	—	—
41	West End,	—	—	—	—	—	—	—
42	Winnisimmet,	—	—	—	—	—	—	—
43	Worcester, ²	178,816	1,236,349	34,662	36	60	—	—
44	Worcester Consolidated, ⁶	203,342	1,450,870	38,127	38	122	—	—
	Total, ⁷	20,625,846	124,787,328	3,222,607	39	5,222	8	123

¹ From Oct. 1, 1886, to April 30, 1887.² From Oct. 1, 1886, to May 31, 1887.³ From Oct. 1, 1886, to April 30, 1887.⁴ From Oct. 1, 1886, to April 19, 1887.⁵ From May 1, 1887, to Sept. 30, 1887.⁶ From June 1, 1887, to Sept. 30, 1887.⁷ Acushnet, Citizens', New Bedford & Fairhaven, Salem & Danvers and Worcester Companies not included

COMPARATIVE STATEMENTS FROM STREET RAILWAY RETURNS.

	STREET RAILWAYS.	PER MILE OF ROAD OWNED.			PER MILE OF ROAD OPERATED.			
		61.—Capital Stock Paid in	62.—Net Debt.	63.—Cost of Construction.	64.—Cost of Equipment.	65.—Repairs of Road-bed and Track.	66.—Repairs of Equipment.	67.—Renewals Horses.
1	Aenshnet,	\$17,543 86	\$7,286 59	\$12,106 33	\$6,993 63	\$32 70	\$386 92	-
2	Albany Street Freight,	58,411 20	-	57,320 40	-	-	-	-
3	Arlington,	15,862 94	-	15,862 94	-	-	-	-
4	Brookton,	14,196 48	10,387 26	16,017 63	4,560 25	178 44	327 36	\$100 98
5	Black Rocks & Salisbury B'h,	-	-	-	-	-	-	-
6	Boston & Chelsea,	29,397 47	-	29,397 47	-	-	-	-
7	Boston Consolidated,	37,573 21	22,704 27	25,574 82	12,407 44	222 54	1,194 97	759 73
8	Cambridge,	35,893 09	13,573 58	25,297 96	10,111 74	435 26	1,133 00	543 51
9	Citizens',	15,163 00	7,830 84	14,650 94	4,429 72	4 38	309 20	65 62
10	East Middlesex,	13,408 42	8,352 30	14,241 28	4,442 97	124 25	77 34	31 32
11	Fitchburg,	14,602 09	205 67	13,076 82	3,514 83	165 02	261 67	-
12	Globe,	22,853 66	580 46	15,625 69	4,933 11	292 76	612 16	237 68
13	Gloucester,	14,492 75	7,620 62	10,674 35	6,751 20	393 84	551 90	-
14	Haverhill & Groveland,	11,466 79	418 93	5,845 22	3,549 11	364 77	457 89	110 75
15	Holyoke,	6,983 24	6,288 54	7,828 61	5,982 72	446 56	550 00	152 23
16	Hoosac Valley,	8,399 13	13,014 17	15,826 84	2,337 31	391 84	155 88	-
17	Lowell,	9,092 56	3,564 51	10,539 32	4,374 51	689 79	648 84	153 22
18	Lowell & Dracut,	4,754 04	6,592 64	7,658 90	3,080 33	-	-	-
19	Lynn & Boston,	7,042 42	11,300 54	11,283 62	3,859 39	540 63	766 01	316 82
20	Malden & Melrose,	26,324 16	-	26,324 16	-	-	-	-
21	Merrimack Valley,	6,622 50	1,200 26	3,973 51	2,450 33	340 36	669 40	230 46
22	Metropolitan,	23,449 41	17,633 50	20,429 37	11,394 90	670 66	1,809 54	865 14
23	Namkeag,	8,101 10	13,041 59	15,353 20	3,967 14	132 20	314 37	194 44
24	Natick & Cochrutuate,	8,333 34	516 24	7,183 34	2,300 00	520 25	-	71 67
25	Newton,	-	-	-	-	-	-	-

26	New Bedford & Fairhaven,	14,552 11	5,374 81	12,360 54	5,483 40	206 99	375 26	-
27	Newburyport & Amesbury,	9,090 91	9,577 19	12,236 58	4,443 31	1,900 18	267 60	-
28	Northampton,	15,625 00	1,560 57	11,250 00	2,849 22	612 17	445 75	241 78
29	North Woburn,	15,889 83	-	10,895 70	3,061 85	166 28	94 40	54 87
30	Onset,	-	-	-	-	-	-	-
31	Pittsfield,	13,063 64	1,563 95	8,553 95	4,049 20	310 61	229 60	227 27
32	Plum Island,	-	-	-	-	-	-	-
33	Salem & Danvers,	11,077 88	3,218 36	7,097 88	3,144 09	7 26	79 75	4 30
34	Somerville,	31,358 90	-	31,358 90	-	-	-	-
35	South Boston,	57,625 82	26,478 21	23,260 71	17,829 20	1,280 12	2,078 46	1,529 08
36	Springfield,	22,338 05	-	11,372 71	5,057 32	365 35	684 39	233 25
37	Suburban,	-	-	-	-	-	-	-
38	Taunton,	11,285 71	359 53	7,247 49	4,240 94	363 15	544 88	50 32
39	Union,	15,851 72	5,874 54	12,501 90	5,797 63	124 32	276 71	-
40	Waltham & Newton,	9,342 88	4,379 24	11,676 55	2,915 56	332 74	118 30	-
41	West End,	-	-	-	-	-	-	-
42	Winnisimmet,	26,550 55	-	26,550 55	-	-	-	-
43	Worcester,	6,032 27	14,111 77	16,051 67	8,162 11	715 58	819 85	157 47
44	Worcester Consolidated,	23,954 55	11,359 98	20,139 89	7,488 49	179 12	337 48	280 05
Average,		\$21,482 94	\$11,187 28	\$17,628 37	\$7,961 89	\$464 66	\$981 16	\$476 22

COMPARATIVE STATEMENTS FROM STREET RAILWAY RETURNS — Continued.

	STREET RAILWAYS.	GROSS INCOME.				EXPENSES.	
		68. — Per Mile Operated.	69. — Per Round Trip.	70. — Per Mile Run.	71. — Per Passenger Carried.	72. — Per Mile Operated.	73. — Per Round Trip.
1	Acushnet,	\$2,888 02	\$0 78	\$0.1386	\$0.0517	\$5,052 27	\$1 37
2	Albany Street Freight,	—	—	—	—	—	—
3	Arlington,	—	—	—	—	—	—
4	Brookton,	6,537 81	3 19	.2540	.0567	6,406 43	3 13
5	Black Rocks & Salisbury Beach,	—	—	—	—	—	—
6	Boston & Chelsea,	—	—	—	—	—	—
7	Boston Consolidated,	18,142 35	2 80	.3327	.0489	15,137 86	2 34
8	Cambridge,	12,815 19	2 48	.3015	.0539	11,376 64	2 20
9	Citizens',	4,205 53	1 25	.2725	.0484	4,025 99	1 20
10	East Middlesex,	1,543 96	1 60	.2946	.0739	1,403 19	1 45
11	Fitchburg,	6,189 28	1 45	.2991	.0607	4,668 37	1 09
12	Globe,	9,321 51	1 21	.2956	.0496	7,565 14	98
13	Gloucester,	8,061 50	1 64	.2691	.0546	7,752 14	1 58
14	Haverhill & Groveland,	4,493 66	1 75	.3027	.0635	4,313 25	1 80
15	Holyoke,	7,245 44	1 17	.2568	.0527	6,549 07	1 06
16	Hoosac Valley,	2,986 18	3 05	.2539	.0512	2,635 64	2 69
17	Lowell,	9,186 31	3 25	.3249	.0506	7,778 51	2 75
18	Lowell & Dracut,	1,227 18	74	.1671	.0536	826 75	49
19	Lynn & Boston,	8,807 86	2 82	.3251	.0531	7,760 88	2 49
20	Malden & Melrose,	—	—	—	—	—	—
21	Merrimack Valley,	7,606 17	1 21	.2709	.0578	5,615 59	90
22	Metropolitan,	24,211 81	2 00	.3107	.0512	20,483 41	1 69
23	Namkeag,	5,919 05	2 31	.3751	.0542	4,506 07	1 76
24	Natick & Cohituate,	4,799 36	2 16	.3609	.0634	3,085 35	1 39
25	Newton,	—	—	—	—	—	—

26	New Bedford & Fairhaven, .	.	.	.	4,158 77	74	.1738	.0515	4,746 42	85
27	Newburyport & Amesbury, .	.	.	.	4,952 13	4 36	.3302	.0681	6,035 96	5 32
28	Northampton, .	.	.	.	4,598 76	2 02	.3163	.0800	4,018 02	1 77
29	North Woburn, .	.	.	.	2,619 51	1 43	.2814	.0560	2,157 35	1 18
30	Onset, .	.	.	.	—	—	—	—	—	—
31	Pittsfield, .	.	.	.	4,711 29	2 29	.3807	.0500	5,637 17	2 74
32	Plum Island, .	.	.	.	—	—	—	—	—	—
33	Salem & Danvers, .	.	.	.	1,537 37	2 22	.1836	.0636	1,423 30	2 05
34	Somerville, .	.	.	.	—	—	—	—	—	—
35	South Boston, .	.	.	.	27,796 11	2 25	.3402	.0493	25,257 79	2 04
36	Springfield, .	.	.	.	8,667 00	1 49	.3121	.0545	6,409 25	1 10
37	Suburban, .	.	.	.	—	—	—	—	—	—
38	Taunton, .	.	.	.	4,702 57	1 00	.2513	.0480	4,068 27	86
39	Union, .	.	.	.	3,860 54	1 13	.2595	.0471	3,005 96	88
40	Waltham & Newton, .	.	.	.	4,083 53	2 20	.3451	.0510	3,548 42	1 91
41	West End, .	.	.	.	—	—	—	—	—	—
42	Winnisimmet, .	.	.	.	—	—	—	—	—	—
43	Worcester, .	.	.	.	9,361 90	1 79	.3468	.0502	8,262 33	1 58
44	Worcester Consolidated, .	.	.	.	4,864 16	1 86	.3501	.0490	3,499 25	1 34
Average,					\$13,129 12	\$2 00	\$0.3132	\$0.0518	\$11,260 90	\$1 72

COMPARATIVE STATEMENTS OF STREET RAILWAY RETURNS — Concluded.

		EXPENSES — Continued.		NET INCOME.			
		74. — Per Mile Run.	75. — Per Passenger Carried.	76. — Per Mile Operated.	77. — Per Round Trip.	78. — Per Mile Run.	79. — Per Passenger Carried.
STREET RAILWAYS.							
1	Acushnet,	\$0.2424	\$0.0905	\$2,164 25 ¹	\$0.59 ¹	\$0.1038 ¹	\$0.0388 ¹
2	Albany Street Freight,	—	—	—	—	—	—
3	Arlington,	—	—	—	—	—	—
4	Brockton, . . . . .	.2489	.0555	131 38	.06	.0051	.0012
5	Black Rocks & Salisbury Beach,	—	—	—	—	—	—
6	Boston & Chelsea,	—	—	—	—	—	—
7	Boston Consolidated, . . . . .	.2776	.0408	3,004 49	.46	.0551	.0081
8	Cambridge, . . . . .	.2676	.0479	1,438 55	.28	.0339	.0060
9	Citizens', . . . . .	.2609	.0464	179 54	.05	.0116	.0020
10	East Middlesex, . . . . .	.2678	.0671	140 77	.15	.0268	.0068
11	Fitchburg, . . . . .	.2256	.0457	1,520 91	.36	.0735	.0150
12	Globe, . . . . .	.2400	.0402	1,756 37	.23	.0556	.0094
13	Gloucester, . . . . .	.2588	.0525	309 36	.06	.0103	.0021
14	Haverhill & Groveland, . . . . .	.3113	.0653	119 59 ¹	.05 ¹	.0086 ¹	.0018 ¹
15	Holyoke, . . . . .	.2321	.0477	696 37	.11	.0247	.0050
16	Hoosac Valley, . . . . .	.2241	.0452	350 54	.36	.0298	.0060
17	Lowell, . . . . .	.2751	.0429	1,407 80	.50	.0498	.0077
18	Lowell & Dracut, . . . . .	.1126	.0361	400 43	.25	.0545	.0175
19	Lynn & Boston, . . . . .	.2865	.0470	1,046 98	.33	.0386	.0064
20	Malden & Melrose,	—	—	—	—	—	—
21	Merrimack Valley, . . . . .	.2000	.0427	1,990 58	.31	.0709	.0151
22	Metropolitan, . . . . .	.2628	.0433	3,728 40	.31	.0479	.0079
23	Naumkeag, . . . . .	.2855	.0413	1,412 88	.55	.0896	.0129
24	Natick & Cohituate, . . . . .	.2320	.0408	1,714 01	.77	.1289	.0226
25	Newton,	—	—	—	—	—	—

26	New Bedford & Fairhaven, .	.	.	.	.	.1983	.0588	587 65 ¹	.11 ¹	.0245 ¹	.0073 ¹
27	Newburyport & Amesbury, .	.	.	.	.	.4024	.0830	1,083 83 ¹	.96 ¹	.0722 ¹	.0149 ¹
28	Northampton, .	.	.	.	.	.2764	.0699	580 74	.25	.0399	.0101
29	North Woburn, .	.	.	.	.	.2329	.0464	462 16	.25	.0485	.0096
30	Onset, .	.	.	.	.	—	—	—	—	—	—
31	Pittsfield, .	.	.	.	.	.4555	.0598	925 88 ¹	.49 ¹	.0748 ¹	.0098 ¹
32	Plum Island, .	.	.	.	.	—	—	—	—	—	—
33	Salem & Danvers, .	.	.	.	.	.1700	.0589	114 07	.17	.0136	.0047
34	Somerville, .	.	.	.	.	—	—	—	—	—	—
35	South Boston, .	.	.	.	.	.3091	.0448	2,538 32	.21	.0311	.0045
36	Springfield, .	.	.	.	.	.2308	.0403	2,257 75	.39	.0813	.0142
37	Suburban, .	.	.	.	.	—	—	—	—	—	—
38	Taunton, .	.	.	.	.	.2174	.0415	634 30	.14	.0339	.0065
39	Union, .	.	.	.	.	.2021	.0366	854 58	.25	.0574	.0105
40	Waltham & Newton, .	.	.	.	.	.2999	.0443	535 11	.29	.0452	.0067
41	West End, .	.	.	.	.	—	—	—	—	—	—
42	Winnistunnet, .	.	.	.	.	—	—	—	—	—	—
43	Worcester, .	.	.	.	.	.3061	.0443	1,099 57	.21	.0407	.0059
44	Worcester Consolidated, .	.	.	.	.	.2519	.0352	1,364 91	.52	.0982	.0138
	Average, .	.	.	.	.	.2686	.0444	\$1,808 22	.28	.0446	.0074

¹ Deficit.

MEMORANDUM.

According to the return, as filed by the Cambridge Railroad Company, the property accounts were increased during the year \$8,070.18, — thus omitting to make any mention of the property of the Charles River Street Railway Company, which at midnight, on Sept. 30, 1886, was purchased by or consolidated with the Cambridge Railroad Company. This property was actually carried into the accounts of the Cambridge Railroad Company at the sum of \$512,101.20; there was a credit to property account of \$23,450.44 for hay and straw, which, by error in 1886, had been carried into permanent investments, so that the net increase of property accounts for the year instead of being \$8,070.18, as reported, should have been \$496,720.94. The reason given by the president of the Cambridge Railroad Company for not including the property of the Charles River Company, as an addition to the property account for the year, was that the Cambridge Railroad Company which existed at the beginning of the present year was not the same as the corporation of the same name which existed last year, but was an entirely new corporation formed by consolidation; that this new corporation entered upon the year holding the property of the old Cambridge and the Charles River Street Railway Companies; and that, therefore, the property of the Charles River Company cannot be said to have been added during the year.

CHARLES RIVER STREET RAILWAY COMPANY.

The directors of this company make the following report: —

At a meeting of the stockholders, Sept. 14, 1886, it was voted that the Charles River Street Railway Company consolidate with the Cambridge Railroad Company, and consolidation took place in accordance with said vote.

Revenue for the Year.

Cash on hand after consolidation belonging to the Charles River Street Railway Company,	\$41,386 77
Interest received on same,	575 25
Cambridge Railroad Company for three months' interest on \$150,000 five per cent. bonds,	1,875 00
Outstanding bills collected,	120 00
Total income,	\$43,957 02

Expenses for the Year.

Wages and salaries of president, superintendent and their clerks,*	\$13,182 47
Taxes, state and local,	2,266 26
Rents and tolls paid other companies for use of their roads,	1,224 64
Cambridge Railroad Company,	\$1,224 64
Office expenses, and all other expenses not included above,	783 65
Total expenses,	\$17,457 02
Total net income above expenses,	26,500 00
Interest accrued during the year,	3,750 00
Dividends declared six and a half per cent. for the year (division of cash in treasury),	22,750 00
Deficit at commencement of year,	10,308 77

From this statement it appears that the operation of the road in previous years shows a deficit of \$10,308.77, but that by the issue of \$50,000 of capital stock, which stock was upon consolidation exchanged for Cambridge Railroad Stock, a dividend of \$22,750 was paid to the stockholders.

* The \$13,182.47 includes all salaries paid to the president and treasurer for their services from March 30, 1881, to Sept. 30, 1886.

TABULATED STATEMENT

COMPILED FROM

RETURNS OF RAILROADS.

RAILROADS AND BRANCHES. (BRANCHES IN ITALICS.)	WHERE LOCATED.		LENGTH.		DOUBLE TRACK.		SIDINGS.		7. — Total length computed as single track.
	From.	To.	1. — Total.	2. — In Mass.	3. — In Mass.	4. — Out of Mass.	5. — In Mass.	6. — Out of Mass.	
ATTLEBOROUGH BRANCH. (See <i>Boston & Providence</i>).									
BERKSHIRE. (See <i>Housatonic</i>).									
BOSTON & ALBANY.									
<i>Alhol.</i>	Boston.	Albany, N. Y.	201.650	162.350	162.350	39.300	193.990	32.500	748.610
<i>Grand Junction.</i>	Springfield.	Athol.	46.510	46.510	—	—	—	—	—
<i>Newton Lower Falls.</i>	Cottage Farm.	East Boston.	9.300	9.300	5.020	—	—	—	—
<i>Newton Highlands.</i>	Riverside June.	Newton L. Falls.	1.100	1.100	—	—	—	—	—
	Beacon St., Boston.								
<i>Saxtonville.</i>	ton.	Riverside Jct.	9.930	9.930	9.930	—	—	—	—
<i>Milford.</i>	Natick.	Saxtonville.	3.700	3.700	—	—	—	—	—
<i>Millbury.</i>	S. Framingham.	Milford.	12.	12.	—	—	—	—	—
<i>Chatham & Hudson.</i>	Millbury June.	Millbury Village.	3.	3.	—	1.	—	—	—
North Brookfield.	Chatham, N. Y.	Hudson, N. Y.	17.330	—	—	—	—	—	4.650
Pittsfield & North Adams.	E. Brookfield.	N. Brookfield.	4.160	4.160	—	—	.490	—	23.620
Providence, Webster & Springfield.	Pittsfield.	North Adams.	18.550	18.550	—	—	5.070	—	—
Ware River.	North Webster.	Auburn Station.	10.120	10.120	—	—	1.640	—	12.760
Spencer.	Palmer.	Winchendon.	49.350	49.350	—	—	5.660	—	55.010
	Spencer.	B. & A. R.R.	2.165	2.165	—	—	.745	—	2.910
BOSTON & LOWELL.	Boston.	Lowell.	26.750	26.750	26.750	—	57.340.	—	197.630
<i>Lexington & Arlington.</i>	Medford June.	Lexington.	9.250	9.250	9.250	—	—	—	—
<i>Stoneham.</i>	Woburn June.	Stoneham.	2.500	2.500	2.500	—	—	—	—
<i>Woburn.</i>	Winchester.	N. Woburn Jct.	6.200	6.200	6.200	—	—	—	—
<i>Mystic.</i>	Milk Row June.	Mystic Wharves.	2.250	2.250	2.250	—	—	—	—
<i>Lawrence.</i>	—	In Wilmington.	3.210	3.210	—	—	—	—	—
<i>Middlesex Central.</i>	Lexington.	Concord.	11.080	11.080	—	—	—	—	—
<i>Salem & Lowell.</i>	Tewksbury.	Peabody.	16.800	16.800	—	—	—	—	—
<i>Lowell & Lawrence.</i>	Lowell.	S. Lawrence.	12.420	12.420	—	—	—	—	—
<i>Bedford & Billerica.</i>	Bedford.	Billerica.	7.630	7.630	—	—	—	—	—

RAILROADS AND BRANCHES. (BRANCHES IN ITALICS.) (Continued.)	WHERE LOCATED.		LENGTH.		DOUBLE TRACK.		SIDINGS.		7.—Total length com- puted as single track.
	From.	To.	1.—Total.	2.—In Mass.	3.—In Mass.	4.—Out of Mass.	5.—In Mass.	6.—Out of Mass.	
BOSTON & PROVIDENCE, <i>West Roxbury</i> ,	Boston.	Providence, R.I.,	44.	38.142	38.142	5.858	40.000	12.000	159.752
<i>Dedham</i> ,	Forest Hills Sta'n.	Dedham,	5.366	5.366	—	—	—	—	—
<i>Stoughton</i> ,	Readville,	Dedham,	2.224	2.224	—	—	—	—	—
<i>India Point</i> ,	Canton,	Stoughton,	4.114	4.114	—	—	—	—	—
Attleborough Branch,	Seckonk,	Providence, R.I.,	8.048	3.485	—	—	—	—	—
BOSTON, WINTHROP & SHORE, <i>Narrow Gauge</i> ,	Attleborough,	N. Attleborough,	4.	4.	—	—	1.	—	5.
<i>Wide Gauge</i> ,	Point Shirley,	Point of Pines,	6.410	6.410	—	—	.990	—	10.500
<i>Winthrop</i> ,	Ocean Spray,	Winthrop J.,	1.780	1.780	—	—	—	—	—
CENTRAL MASSACHUSETTS, <i>Monadnock</i> ,	Crescent Beach,	Revere J., . . . . .	.460	.460	—	—	—	—	—
CHESHIRE,	Bartlett P'k,	Branch Jet., . . . . .	.860	.860	—	—	—	—	—
<i>Chelsea Beach (See Eastern)</i> ,	Cambridge,	Ware,	70.200	70.200	—	—	12.000	—	82.200
CONNECTICUT RIVER,	S. Ashburnham,	Bellows Falls, Vt.,	53.620	10.810	—	—	3.170	14.120	70.910
<i>Chicopee Falls</i> ,	Winchendon,	Peterboro', N.H.,	15.800	2.038	—	—	—	.700	16.500
<i>Easthampton</i> ,	—	—	—	—	—	—	—	—	—
DANVERS, (Sec <i>Boston &</i> <i>Maine</i>),	Springfield,	S. Vernon, Vt.,	50.	50.	36.000	—	41.920	—	133.770
EASTERN, (Sec <i>Boston &</i> <i>Maine</i>),	Chicopee,	Chicopee Falls,	2.350	2.350	—	—	—	—	—
FALL RIVER, (See <i>Old Colony</i>),	Mt. Tom June.,	Easthampton,	3.500	3.500	—	—	—	—	—
FALL RIVER, WARREN & PROVIDENCE (owned by <i>Old Colony Railroad Co.</i>),	—	—	—	—	—	—	—	—	—
	Fall River,	Warren, R. I.,	5.794	3.662	—	—	.040	.480	6.314

FITCHBURG,		Boston, Greenfield, Johns'ville, N.Y.	Fitchburg, Troy, N.Y., Rot'dam Jet., N.Y.	50. 85.81 35.50	50. 44.00 —	94. —	128.750	37.610	560.300
<i>Ashturnham,</i>		—	In Ashburnham,	2.590	2.590	—	—	—	—
<i>Lee,</i>		—	In Charlestown,	.680	.680	—	—	—	—
<i>Watertown Branch,</i>		—	Waltham, . .	8.260	8.260	—	—	—	—
<i>Marlborough,</i>		—	Marlborough, .	12.420	12.420	—	—	—	—
<i>Peterborough & Shirley,</i>		—	Greenville, N.H.,	23.620	14.250	—	—	—	—
<i>Worcester,</i>		—	Winchendon,	36.	36.	—	—	—	—
<i>Saratoga,</i>		—	Schuylerville, N.Y.,	25.50	—	—	—	—	—
Vermont & Massachusetts, <i>Turner's Falls,</i>		Fitchburg, Greenfield,	Greenfield, Turner's Falls,	56. 2.800	56. 2.800	56.000	28.100	—	142.900
GRAFTON CENTRE,		Greenfield,	Turner's Falls,	3.	3.	—	.100	—	3.100
HOLYOKE & WESTFIELD. (See <i>N. Haven & Northampton</i>),		—	Grafton Centre,	—	—	—	—	—	—
HORN POND BRANCH. (See <i>Boston & Lowell</i>),		—	—	—	—	—	—	—	—
HORSATONIC (Ct.),		—	—	—	—	—	—	—	—
Berkshire,		—	—	—	—	—	—	—	—
Stockbridge & Pittsfield,		W. Stockbridge,	State Line of Ct.,	21.030	21.030	—	4.490	—	25.520
West Stockbridge,		Vandeuensville,	Pittsfield, . .	22.930	22.930	—	4.990	—	27.920
LOWELL & ANDOVER. (See <i>Boston & Manchester</i>),		W. Stockbridge,	State Line, N.Y.,	2.640	2.640	—	2.380	—	5.020
MILFORD, FRANKLIN & PROV. (See <i>Milford & Woonsocket</i>),		—	—	—	—	—	—	—	—
MILFORD & WOONSOCKET,		—	—	—	—	—	—	—	—
Milford, Franklin & Prov.,		Ashland, . .	Bellingham,	15.327	15.327	—	1.900	—	17.227
MONADNOCK. (See <i>Cheshire</i>),		Franklin, . .	Bellingham,	4.600	4.600	—	.407	—	5.007
		—	—	—	—	—	—	—	—

UNION FREIGHT,	B. & L. R. R.,	Old Colony R.R.,	2.431	.937	—	1,280	—	4,648
VERMONT & MASSACHUSETTS, (See <i>Fitchburg</i>),	—	—	—	—	—	—	—	—
WARE RIVER. (See <i>Boston & Albany</i>),	—	—	—	—	—	—	—	—
WEST AMESBURY BRANCH, (See <i>Boston & Maine</i>),	—	—	—	—	—	—	—	—
WEST STOCKBRIDGE. (See <i>Housatonic</i>),	—	—	—	—	—	—	—	—
WORCESTER, NASHUA & ROCH- ESTER. (See <i>Boston & Maine</i>),	—	—	—	—	—	—	—	—
NARROW GAUGE.								
BOSTON, REVERE BEACH & LYNN,	East Boston, Oak Bluffs, Katama, . . . . .	. . . . . . . . . . . . . . .	8,800 8,330 .450	8,300 — —	8,300 — —	2,250 .500 —	— — —	19,600 9,280 —
MARTHA'S VINEYARD,	Katama, . . . . .	. . . . .	.450	—	—	—	—	—
NANTUCKET,	Nantucket, Worcester, . . . . .	. . . . . . . . . .	11,160 2,700	— —	11,160 2,700	.080 —	— —	11,240 2,700
WORCESTER & SHREWSBURY, . .	Worcester, . . . . .	. . . . .	2,700	—	2,700	—	—	—
Total, . . . . .	. . . . .	. . . . .	2,992,823	740,389	296,328	964,330	395,679	5,389,549

	8. — BOSTON & ALBANY.	9. — FITCHBURG.	10. — BOSTON & LOWELL.	11. — BOSTON & MAINE.
CAPITAL STOCK.				
Amount paid in,	\$20,000,000 00	\$20,771,100 00 ⁴	\$5,529,400 00	\$7,000,000 00
Number of stockholders,	6,834	3,677 ⁵	1,406	3,946
Stockholders in Massachusetts,	5,894	3,182 ⁶	1,212	2,925
Amount of stock held in Massachusetts,	\$17,024,000 00	\$13,286,900 00 ⁷	\$4,860,200 00	\$4,766,800 00
DEBT.				
Funded debt,	\$10,858,000 00	\$16,290,600 00	\$6,171,400 00	\$5,000,000 00
Unfunded debt,	750,728 13	2,134,660 10	1,823,666 97	2,499,647 36
TOTAL GROSS DEBT,	11,608,728 13	18,425,260 10	7,995,066 97	7,499,647 36
PERMANENT INVESTMENTS.				
Construction,	\$25,450,340 54	\$31,579,685 27	\$7,244,847 00	\$9,620,937 63
Equipment,	3,145,400 00	2,856,408 51	1,285,262 59	1,308,180 00
Other property,	585,660 96	518,976 25	4,310,893 82	1,127,943 83
TOTAL PERMANENT INVESTMENTS,	29,181,401 50	34,955,070 03	12,841,003 41	12,057,061 46
Cash and cash assets,	2,882,854 16	4,522,964 94	2,504,751 36	4,241,587 04
TOTAL PROPERTY AND ASSETS,	32,064,255 66	39,478,034 97	15,345,754 77	16,298,648 50
REVENUE FOR THE YEAR.				
From local passengers,	\$2,378,259 38	\$1,033,346 94	\$1,567,055 55	\$3,754,055 43
through passengers,	1,227,720 04	369,342 55	547,272 53	620,526 04
express and extra baggage,	263,775 18	103,370 03	118,894 29	209,767 88
mails,	153,696 59	35,712 62	77,583 79	101,221 49
other sources passenger department,	—	23,412 19	—	—
Total earnings passenger department,	4,023,451 19	1,565,184 33	2,310,806 16	4,685,570 84

From local freight,	2,261,611 79	739,109 10	1,517,711 74	2,264,399 56
through freight,	2,231,976 36	1,903,287 83	1,378,131 15	942,662 14
other sources freight department,	—	65,146 76	—	—
<i>Total earnings freight department,</i>	4,493,588 15	2,707,543 69	2,895,842 89	3,207,061 70
TOTAL TRANSPORTATION EARNINGS,	8,517,039 34	4,272,728 02	5,206,649 05	7,892,632 54
From rents for use of road,	—	51,000 00	—	20,972 83
all other sources,	408,705 70	245,593 56	103,979 22	278,777 43
TOTAL INCOME FROM ALL SOURCES,	8,925,745 04	4,569,321 58	5,310,628 27	8,192,382 80
EXPENSES.				
Transportation expenses,	\$5,858,348 99	\$3,287,800 96	\$3,607,581 78	\$4,894,249 22
Taxes,	515,286 82	194,853 08	211,456 60	397,080 88
TOTAL EXPENSES,	6,373,635 81	3,482,654 04	3,819,038 38	5,291,330 10
NET INCOME, DIVIDENDS, ETC.				
Net income,	\$2,552,109 23	\$1,086,667 54	\$1,491,589 89	\$2,901,052 70
Rents,	78,000 00	266,011 12	864,920 07	1,887,075 16
Interest accrued,	662,900 00	423,228 27	262,782 98	312,955 58
Dividends earned,	1,811,209 23	397,428 15	363,886 84	701,021 96
Per cent.,	9.0	—	6.6	10.0
Dividends declared,	1,599,565 00	366,488 00	193,529 00	700,000 00
Per cent.,	8.0	—	3.5	10.0
Balance for the year,	211,644 23	30,940 15	170,357 84	1,021 96
Surplus last year,	1828,834 64 ²	250,734 72 ³	486,194 11	1,797,979 18
Surplus Sept. 30, 1887,	\$617,190 41 ²	281,674 87	656,551 95	1,799,001 14

¹ Surplus last year \$215,570.36; deduct \$1,044,405 for B. & A. R. R., stock distributed to the stockholders.

² Deficit.

³ Not including "Improvement Account," \$1,072,717.94.

⁴ Common, \$7,000,000; preferred, \$12,437,800; stock liability (preferred), \$1,333,300.

⁵ Common, 2; preferred, 3,675.

⁶ Common, 1; preferred, 3,181.

⁷ Common, \$3,000,000; preferred, \$8,286,900.

⁸ Two per cent. on 52,866 shares paid May 2, 1887; 2 per cent. on 124,378 shares, 3-5 of 2 per cent. on 10,000 shares to T. & B. stockholders, payable Nov 15, 1887.

⁹ Balance at commencement of year, \$410,332 72

Less dividend paid Jan. 1, 1887, . . . \$158,598 00

Worthless account, 1,000 00

159,598 00

\$250,734 72

	8.—BOSTON & ALBANY — Con.	9.—FITCHBURG — Con	10.—BOSTON & LOWELL — Con.	11.—BOSTON & MAINE — Con.
MILEAGE, TRAFFIC, ETC.				
Passenger-train mileage,	2,294,064	1,600,412	2,362,623	3,330,535
Freight-train mileage,	2,936,894	1,414,241	1,885,958	1,652,188
Total revenue-train mileage,	5,230,958	3,014,653	4,248,581	4,982,723
Switching-train mileage,	637,367	977,346	709,335	918,981
Other train mileage,	190,085	91,948	150,785	162,696
TOTAL TRAIN MILEAGE,	6,058,410	4,083,947	5,108,701	6,064,400
Number season-ticket passengers,	681,356	322,626	458,148	2,411,654
Number local passengers (including season),	9,621,408	4,617,799	6,958,213	17,601,145
Number through passengers,*	1,093,937	408,246	435,979	767,662
Total number of passengers carried,	10,715,345	5,026,045	7,394,192	18,368,807
Local passenger mileage,	131,666,538	55,795,642	76,945,142	203,502,226
Through passenger mileage,	60,176,616	18,247,856	22,310,842	36,205,118
Total passenger mileage,	191,843,184	74,043,498	99,255,984	239,707,344
Tons of local freight carried,	1,915,265	731,644	1,392,076	1,937,840
Tons of through freight carried,*	1,759,324	2,187,985	1,442,646	1,012,947
Total tons of freight carried,	3,674,589	2,919,629	2,834,722	2,950,787
Local freight mileage,	130,875,680	24,049,721	54,643,332	80,512,230
Through freight mileage,*	275,155,070	214,263,879	113,922,307	64,154,650
Total freight mileage,	406,030,750	238,913,600	168,565,639	144,666,880
Av. rate of fare per mile, local passengers, through passengers,*	1.90 cents.	1.96 cents.	2.19 cents.	2.082 cents.
season-ticket passengers,	2.04 "	2.02 "	2.45 "	1.714 "
ALL PASSENGERS,	0.60 "	0.69 "	0.71 "	0.815 "
Av. rate of freight per mile, local freight, through freight,*	1.73 "	2.39 "	2.13 "	1.825 "
ALL FREIGHT,	0.81 "	0.89 "	2.78 "	2.812 "
	1.10 "	1.13 "	1.71 "	1.469 "
				2.217 "

Passengers to Boston (including season), . . . . .	.	.	.	.	1,709,898	2,620,974	6,092,135
Passengers from Boston (including season), . . . . .	.	.	.	.	1,680,817	2,569,075	6,078,112
Season-ticket passengers to and from Boston, . . . . .	.	.	.	.	150,932	342,269	1,471,846
EQUIPMENT.							
Number of locomotives, . . . . .	.	.	.	.	175	193	240
passenger cars, . . . . .	.	.	.	.	179	176	386
parlor and sleeping cars, . . . . .	.	.	.	.	—	12	15
mail, baggage, and express cars, . . . . .	.	.	.	.	46	94	93
freight cars (basis 8 wheels), . . . . .	.	.	.	.	4,705	4,460	4,303
other cars, . . . . .	.	.	.	.	215	88	330
GENERAL INFORMATION, ETC.							
Total miles of road operated, . . . . .	.	.	.	.	344.22	891.19	609.31
Same in Massachusetts, . . . . .	.	.	.	.	227.00	191.09	252.04
Average number of persons employed, . . . . .	.	.	.	.	3,324	4,066	5,017

* To and from other roads.

	12. — BOSTON & PROVIDENCE.	13. — NEW YORK & NEW ENGLAND.	14. — OLD COLONY.	15. — CHESHIRE.
CAPITAL STOCK.				
Amount paid in,	\$4,000,000 00	\$21,950,000 00 ²	\$11,364,600 00	\$2,153,300 00
Number of stockholders,	1,484	1,447 ³	5,770	459
Stockholders in Massachusetts,	1,182	795 ⁴	5,418	372
Amount of stock held in Massachusetts,	\$3,381,800 00	\$5,409,400 00 ⁵	\$10,603,000 00	\$1,618,100 00
DEBT.				
Funded debt,	\$1,260,000 00	\$15,913,174 92	\$9,607,300 00	\$800,000 00
Unfunded debt,	344,518 80	982,165 06	1,477,038 07	96,416 04
TOTAL GROSS DEBT,	1,604,518 80	16,895,339 98	11,084,338 07	896,416 04
PERMANENT INVESTMENTS.				
Construction,	\$4,776,522 97	\$32,959,626 58	\$18,501,811 00	\$2,395,268 94
Equipment,	207,400 00	3,818,456 02	2,190,477 75	322,266 32
Other property,	304,461 50	542,592 33	1,689,562 81	—
TOTAL PERMANENT INVESTMENTS,	5,288,384 47	37,320,674 93	22,381,851 56	2,717,535 26
Cash and cash assets,	432,175 75	1,112,662 87	1,077,921 28	421,972 53
TOTAL PROPERTY AND ASSETS,	5,720,560 22	38,433,337 80	23,459,772 84	3,139,507 79
REVENUE FOR THE YEAR.				
From local passengers,	\$1,005,940 66	\$982,804 95	\$2,091,283 40	\$50,149 69
through passengers,	167,843 51	393,625 89	481,292 75	125,292 20
express and extra baggage,	49,382 72	111,784 43	157,033 57	7,500 00
mails,	13,494 91	46,707 84	43,188 87	11,875 08
other sources passenger department,	—	—	—	7,500 00
Total earnings passenger department,	1,236,661 80	1,534,923 11	2,772,798 59	202,316 97

From local freight,	381,978 42	807,771 96	1,311,819 16	28,824 55
through freight,	262,636 65	1,678,140 89	684,104 45	413,587 07
other sources freight department,	—	—	—	—
<i>Total earnings freight department,</i>	644,615 07	2,485,912 85	1,995,923 61	442,411 62
TOTAL TRANSPORTATION EARNINGS,	1,881,276 87	4,020,835 96	4,768,722 20	644,728 59
From rents for use of road,	—	—	3,600 00	—
all other sources,	24,218 67	196,849 07	364,986 69	26,101 36
TOTAL INCOME FROM ALL SOURCES,	1,905,495 54	4,217,685 03	5,137,308 89	670,829 95
EXPENSES.				
Transportation expenses,	\$1,725,420 89	\$2,753,741 94	\$3,440,067 05	\$425,274 39
Taxes,	120,490 27	163,566 03	255,403 99	26,065 58
TOTAL EXPENSES,	1,845,911 16	2,917,307 97	3,695,471 04	451,339 97
NET INCOME, DIVIDENDS, ETC.				
Net income,	\$59,584 38	\$1,300,377 06	\$1,441,837 85	\$219,489 98
Rents,	11,890 12	66,635 78	16,134 05	51,000 00
Interest accrued,	21,990 69	969,619 89	597,897 35	48,000 00
Dividends earned,	33,880 81	264,121 39	827,806 45	120,489 98
Per cent.,	—	1.2	7.3	5.6
Dividends declared,	400,000 00	135,975 00	788,615 40	126,000 00
Per cent.,	10.0	7.0 ⁶	7.0	6.0
Balance for the year,	374,296 43 ¹	127,139 46 ⁷	39,191 05	5,510 02 ¹
Surplus last year,	490,337 85	639,141 64 ¹	959,718 72	95,301 77
Surplus Sept. 30, 1887,	116,041 42	512,002 18 ¹	998,909 77	89,791 75

¹ Deficit.² \$20,000,000 common, \$1,950,000 preferred.³ 1,168 common, 279 preferred.⁴ 571 common, 224 preferred.⁵ \$3,653,700 common, \$1,755,700 preferred.⁶ On preferred stock.⁷ \$1,006.93 deducted for loss operating Boston Grain Elevator.

	12. — BOSTON & PROVIDENCE — Con.	13. — NEW YORK & NEW ENGLAND — Con.	14. — OLD COLONY — Con.	15. — CHESHIRE — Con.
MILEAGE, TRAFFIC, ETC.				
Passenger-train mileage,	802,242	1,289,064	1,978,110	169,353
Freight-train mileage,	241,269	1,153,620	778,503	420,499
Total revenue-train mileage,	1,043,511	2,442,684	2,756,613	589,852
Switching-train mileage,	60,355	761,252	768,990	63,131
Other train mileage,	—	141,217	243,719	16,471
TOTAL TRAIN MILEAGE,	1,103,866	3,345,153	3,769,322	669,454
Number season-ticket passengers,	576,853	850,260	2,166,671	6,138
Number local passengers (including season),	6,462,483	5,022,760	8,576,933	93,454
Number through passengers,*	255,990	676,034	945,434	99,186
Total number of passengers carried,	6,718,473	5,698,794	9,522,367	192,640
Local passenger mileage,	55,202,756	49,251,650	141,253,293	1,644,313
Through passenger mileage,*	7,214,020	17,119,127	24,068,868	4,043,101
Total passenger mileage,	62,416,776	66,370,777	165,322,161	5,687,414
Tons of local freight carried,	420,329	581,595	1,204,756	36,241
Tons of through freight carried,*	355,666	1,640,516	729,335	664,988
Total tons of freight carried,	775,995	2,225,141	1,934,091	701,229
Local freight mileage,	10,774,748	23,961,685	36,843,509	966,289
Through freight mileage,*	11,260,652	128,777,890	31,912,305	37,739,701
Total freight mileage,	22,035,400	152,739,575	68,755,814	38,705,990
Av. rate of fare per mile, local passengers,	1.934 cents.	2.175 cents.	2.00 cents.	3.50 cents.
through passengers,*	2.090 "	2.298 "	2.00 "	3.10 "
season-ticket passengers,	0.918 "	0.806 "	0.70 "	1.60 "
ALL PASSENGERS,	1.853 "	2.074 "	1.50 "	3.10 "
Av. rate of freight per mile, local freight,	3.545 "	3.370 "	4.30 "	5.00 "
through freight,*	2.332 "	1.303 "	2.10 "	1.96 "
ALL FREIGHT,	2.925 "	1.630 "	2.90 "	1.14 "

Passengers to Boston (including season), . . .	2,419,349	1,236,202	2,594,174	-
Passengers from Boston (including season), . . .	2,540,936	1,233,509	2,584,272	-
Season-ticket passengers to and from Boston, . . .	418,164	273,066	1,318,384	-
EQUIPMENT.				
Number of locomotives, . . .	62	147	140	30
passenger cars, . . .	168	149	264	26
parlor and sleeping cars, . . .	24†	3	12	-
mail, baggage, and express cars, . . .	18	45	43	11
freight cars (basis 8 wheels), . . .	540	3,579	2,430	453
other cars, . . .	442	11	17	32
GENERAL INFORMATION, ETC.				
Total miles of road operated, . . .	67,752	379,76	476,26	64.01
Same in Massachusetts, . . .	57,331	109,67	460,07	21.20
Average number of persons employed, . . .	1,011	3,189	3,517	391

† Line cars 8 per cent. owned.

* To and from other roads.

	16.—CONNECTICUT RIVER.	17.—FALL RIVER, WARREN & PROVIDENCE. ¹	18.—CRAFTON CENTRE. ³	19.—HANOVER BRANCH. ⁵
CAPITAL STOCK.				
Amount paid in,	\$2,370,000 00	\$150,000 00	\$50,000 00	—
Number of stockholders,	944	27	13	—
Stockholders in Massachusetts,	740	11	13	—
Amount of stock held in Massachusetts,	\$1,890,600 00	\$103,300 00	\$50,000 00	—
DEBT.				
Funded debt,	—	\$300,000 00	\$50,000 00	—
Unfunded debt,	\$744,551 75	3,041 37	—	\$204 00
TOTAL GROSS DEBT,	744,551 75	303,041 37	50,000 00	204 00
PERMANENT INVESTMENTS.				
Construction,	\$2,864,792 89	\$310,747 60	\$83,594 51	—
Equipment,	436,681 14	—	15,025 69	—
Other property,	99,610 00	—	—	—
TOTAL PERMANENT INVESTMENTS,	3,401,084 03	310,747 60	98,620 20	—
Cash and cash assets,	701,454 64	3,330 33	2,421 47	\$8,239 19
TOTAL PROPERTY AND ASSETS,	4,102,538 67	314,077 93	101,041 67	8,239 19 ⁶
REVENUE FOR THE YEAR.				
From local passengers,	\$289,183 37	\$464 30	\$4,168 69	\$6,782 08
through passengers,	124,192 94	26,454 25	—	11,760 18
express and extra baggage,	18,500 00	1,500 00	566 28	1,626 97
mails,	11,712 06	445 48	400 00	442 45
other sources passenger department,	—	—	—	—
Total earnings passenger department,	443,588 37	28,864 03	5,134 97	20,611 68

From local freight, through freight, other sources freight department,	163,454 63 332,698 53 —	57 48 6,307 23 —	1,665 22	1,385 36 14,800 59 —
Total earnings freight department,	496,153 16	6,364 71	1,665 22	16,185 95
TOTAL TRANSPORTATION EARNINGS,	939,741 53	35,228 74	6,800 19	36,797 63
From rents for use of roads, all other sources,	33,465 79 973,207 32	45 00 35,273 74	— 6,800 19	5,604 82 42,402 45
TOTAL INCOME FROM ALL SOURCES,				
EXPENSES.				
Transportation expenses,	\$638,784 57	\$21,635 44	\$5,758 52	\$20,457 49
Taxes,	71,650 20	300 50	—	1,858 05
TOTAL EXPENSES,	710,434 77	21,935 94	5,758 52	22,315 54
NET INCOME, DIVIDENDS, ETC.				
Net income,	\$262,772 55	\$13,337 80	\$1,041 67	\$20,086 91
Rents,	23,927 38	—	—	—
Interest accrued,	19,245 17	13,337 80	—	520 83
Dividends earned,	219,600 00	—	1,041 67	19,566 08
Per cent.,	9.3	—	—	—
Dividends declared,	189,600 00	—	—	7,428 00
Per cent.,	8.0	—	—	6.0
Balance for the year,	30,000 00	—	1,041 67	12,138 08
Surplus last year,	957,986 92	138,963 44 ²	4	74,102 89 ²
Surplus Sept. 30, 1887,	987,986 92	138,963 44 ²	1,041 67	8,035 19 ⁶

¹ Road in the possession of Trustees for the bondholders.² Deficit.³ This road was changed from narrow to standard gauge during the year.⁴ \$6,378.01 surplus last year expended in adjustment of old claims.⁵ This road was sold to the Old Colony Railroad Company and this return includes the operation of the road to June 30, since which time the road is called the Hanover Branch in the Old Colony returns.⁶ June 30, 1887.

⁷ Surplus last year, . . . \$140,680 36
Add amount received from sale of property, . . . 123,950 00

\$264,630 36

Deduct —
Construction account, . . . \$194,826 66
Equipment account, . . . 71,312 69
Land and telephone, . . . 2,593 90—
268,733 25
Balance (deficit), . . . \$4,102 89

	16.—CONNECTICUT RIVER—Con.	17.—FALL RIVER, WARREN & PROVIDENCE—Con.	18.—GRAFTON CENTRE—Con.	19.—HANOVER BRANCH—Con.
MILEAGE, TRAFFIC, ETC.				
Passenger-train mileage,	340,077	31,400	14,304	17,525
Freight-train mileage,	151,387	6,260	—	3,800
<i>Total revenue-train mileage,</i>	491,464	37,660	14,304	21,325
Switching-train mileage,	113,051	—	—	—
Other train mileage,	21,936	—	—	—
TOTAL TRAIN MILEAGE,	626,451	37,660	14,304	21,325
Number season-ticket passengers,	355,526	—	—	9,627
Number local passengers (including season),	1,498,648	4,141	33,100	41,752
Number through passengers*,	183,174	173,605	—	61,160
<i>Total number of passengers carried,</i>	1,681,822	177,746	39,100	102,912
Local passenger mileage,	12,439,450	13,021	117,300	201,019
Through passenger mileage,	4,651,326	1,169,796	—	374,500
<i>Total passenger mileage,</i>	17,090,776	1,182,817	117,300	575,519
Tons of local freight carried,	246,117	97	—	3,848
Tons of through freight carried*,	480,046	13,972	—	35,750
<i>Total tons of freight carried,</i>	726,163	14,069	—	39,598
Local freight mileage,	4,033,423	220	—	36,379
Through freight mileage,	12,975,600	111,776	—	205,881
<i>Total freight mileage,</i>	17,009,023	111,996	—	242,260
Average rate of fare per mile, local passengers, through passengers*,	2.32 cents.	3.50 cents.	3.50 cents.	—
season-ticket passengers,	2.67 "	2.20 "	—	—
ALL PASSENGERS,	0.84 "	—	—	—
Average rate of freight per mile, local freight, through freight,	2.42 "	2.30 cents.	3.50 cents.	—
ALL FREIGHT,	4.05 "	10.3 "	—	—
	2.56 "	5.6 "	—	—
	2.92 "	5.7 "	—	—

EQUIPMENT.

Number of locomotives,	43	—†	1	3
passenger cars,	48†	—	1	4
parlor and sleeping cars,	—	—	—	—
mail, baggage, and express cars,	4	—	—	2
freight cars (basis 8 wheels),	511	—	—	18
other cars,	47	—	2	—
GENERAL INFORMATION, ETC.				
Total miles of road operated,	79,850	5,794	3,000	8 00
Same in Massachusetts,	55,925	3,662	3,000	8 00
Average number of persons employed,	590	16	8	31

* To and from other roads.

† Includes fifteen combination cars.

‡ Leases equipment of Old Colony Railroad Company.

	20. — HOUSEHOLDING OF CONNECTICUT.*	21. — MILFORD & WOONSCKET.	22. — MONADNOCK (LESSEES).	23. — NEW HAVEN & NORTHAMPTON.	24. — NEW LONDON NORTHERN†
CAPITAL STOCK.					
Amount paid in,	—	\$148,600 00	—	\$2,460,000 00	\$1,500,000 00
Number of stockholders,	—	30	—	231	336
Stockholders in Massachusetts, . .	—	28	—	37	53
Amount of stock held in Massachusetts, .	—	\$140,800 00	—	\$143,800 00	\$315,200 00
DEBT.					
Funded debt,	—	\$19,000 00	—	\$3,900,000 00	\$1,499,500 00
Unfunded debt,	—	51,346 92	—	181,820 30	138,624 84
TOTAL GROSS DEBT,	—	70,346 92	—	4,081,820 30	1,638,124 84
PERMANENT INVESTMENTS.					
Construction,	—	\$171,431 13	—	\$5,650,038 40	\$2,819,199 28
Equipment,	—	—	—	911,781 53	248,420 44
Other property,	—	—	—	100,372 81	243,170 00
TOTAL PERMANENT INVESTMENTS, . .	—	171,431 13	—	6,662,192 74	3,310,789 72
Cash and cash assets,	—	26,368 60	—	165,839 71	312,754 13
TOTAL PROPERTY AND ASSETS,	—	197,799 73	—	6,828,032 45	3,623,543 85
REVENUE FOR THE YEAR.					
From local passengers,	\$80,262 76	\$16,141 52	\$4,237 41	\$154,437 19	\$127,941 05
through passengers,	32,586 48	9,313 30	6,848 23	66,187 36	87,825 69
express and extra baggage,	5,655 00	1,455 37	1,000 00	15,674 52	10,448 41
mails,	4,653 49	1,108 60	708 83	9,010 24	11,030 00
other sources passenger department, .	—	—	—	—	—
Total earnings passenger department, .	123,157 73	28,018 79	12,794 17	245,309 31	237,245 15

From local freight, through freight,	62,295 64	9,585 43	10,791 31	269,217 77	165,043 39
other sources freight department, <i>Total earnings freight department,</i>	78,600 45	12,167 20	9,959 54	284,326 73	198,888 54
<i>Total earnings freight department,</i>	18,558 41	19 73	933 03	17,898 15	—
TOTAL TRANSPORTATION EARNINGS,	159,454 50	21,772 36	21,683 88	571,442 65	333,931 93
From rents for use of road,	282,612 23	49,791 15	34,478 35	816,751 96	601,177 08
all other sources,	—	—	—	—	—
TOTAL INCOME FROM ALL SOURCES,	2,326 16	50 00	1,920 02	8,480 09	8,682 15
	284,938 89	49,841 15	36,398 37	825,232 05	609,859 23
EXPENSES.					
Transportation expenses,	\$168,565 42	\$44,875 69	\$32,747 00	\$654,466 22	\$396,048 03
Taxes,	6,400 71	957 71	1,448 30	22,082 99	24,565 38
TOTAL EXPENSES,	174,666 13	45,833 40	34,195 30	676,549 21	420,613 41
NET INCOME, DIVIDENDS, ETC.					
Net income,	\$110,272 76	\$4,007 75	\$2,203 07	\$148,652 84	\$229,094 59||
Rents,	—	—	—	26,669 65	—
Interest accrued,	—	4,969 87	—	237,957 21	86,350 00
Dividends earned,	—	—	—	—	142,744 59
Per cent.,	—	—	—	—	—
Dividends declared,	—	—	—	—	—
Per cent.,	—	—	—	—	—
Balance for the year,	—	969 12†	—	115,974 02†	6.25
Surplus last year,	—	20,185 07†	—	402,186 17	48,994 59
Surplus Sept. 30, 1887,	—	‡21,147 19†	—	286,212 15	436,424 42
					485,419 01

§ Lessee's account.

|| Company's account: being amount derived from rent, etc., \$241,-
441.14; less general expenses, \$6,279.65; repairs to wharf,
\$6,066.90; total expenses, \$12,346.55.

* Operating the Berkshire, Stockbridge & Pittsfield and West Stock-

bridge railroads.

† Deficit.

‡ Leased to J. Gregory Smith et al.

	20. — Housatonic of CONNECTICUT — Cor.	21. — MILFORD & WOODSOKET — Cor.	22. — MONADNOCK (LESSEES) — Cor.	23. — NEW HAVEN & NORTHAMPTON — Cor.	24. — NEW LONDON NORTHERN — Cor.
MILEAGE, TRAFFIC, ETC.					
Passenger-train mileage,	113,745	52,632	18,250	348,080	247,416
Freight-train mileage,	95,381	18,720	8,320	267,961	203,017
Total revenue-train mileage,	209,126	71,352	26,770	616,041	450,433
Switching-train mileage,	15,646	7,460	800	76,590	111,247
Other train mileage,	14,006	1,690	950	23,431	1,184
TOTAL TRAIN MILEAGE,	238,778	80,502	28,520	716,062	562,864
Number season ticket passengers,	—	—	—	—	26,830
Number local passengers (including season),	181,036	95,886	12,806	435,269	350,542
Number through passengers,*	90,518	40,399	12,178	97,101	156,338
Total number of passengers carried,	271,555	136,285	24,984	532,370	506,880
Local passenger mileage,	3,115,404	552,237	132,133	6,282,991	4,305,859
Through passenger mileage,*	1,448,388	296,322	139,043	2,863,410	3,419,119
Total passenger mileage,	4,563,792	848,559	271,226	9,146,401	7,724,978
Tons of local freight carried,	57,575	13,806	17,814	290,205	142,281
Tons of through freight carried,*	73,715	37,152	23,554	266,364	403,815
Total tons of freight carried,	131,290	50,958	41,368	556,569	546,096
Local freight mileage,	1,818,080	90,440	252,628	8,945,891	4,703,966
Through freight mileage,*	4,491,454	322,215	356,351	19,070,006	22,091,591
Total freight mileage,	6,309,534	412,655	608,979	28,015,897	26,795,557
Av. rate of fare per mile, local passengers,	3.63 cents.	2.78 cents.	4.00 cents.	2.41 cents.	3.10 cents.
through passengers,*	2.25 "	2.26 "	4.90 "	2.41 "	2.56 "
season-ticket passengers,	—	—	—	—	0.72 "
ALL PASSENGERS,	2.47 cents.	2.80 cents.	4.10 cents.	2.41 cents.	2.79 "
Av. rate of freight per mile, local freight,	13.00 "	10.56 "	8.00 "	3.00 "	3.50 "
through freight,*	1.75 "	3.77 "	2.79 "	1.49 "	0.90 "
ALL FREIGHT,	2.23 "	5.27 "	3.41 "	1.97 "	1.36 "

EQUIPMENT.

Number of locomotives, . . .	-	-†	-	28	26
passenger cars, . . .	-	-	-	27	13
parlor and sleeping cars, . . .	-	-	-	2	-
mail, baggage, and express cars, . . .	-	-	-	12	13
freight cars (basis 8 wheels), . . .	-	-	-	134	325
other cars, . . .	-	-	-	411	7

GENERAL INFORMATION, ETC.

Total miles of road operated, . . .	46.60	19,997	15,800	173.01	121.00
Same in Massachusetts, . . .	46.60	19,997	2,038	106.62	54.00
Average number of persons employed, . . .	221	45	22	540	517

* To and from other roads.

† Equipment sold to N. Y. & N. E. R. R. Co. Sept. 30, 1887.

	25. — NEW YORK, NEW HAVEN & HARTFORD.	26. — NORWICH & WORCESTER.	27. — PROVIDENCE & WORCESTER.	28. — UNION FREIGHT
CAPITAL STOCK.				
Amount paid in,	\$15,500,000 00	\$2,604,400 00	\$3,000,000 00	\$300,000 00
Number of stockholders,	3,545	772	820	3
Stockholders in Massachusetts,	513	613	418	3
Amount of stock held in Massachusetts,	\$2,298,100 00	\$2,004,000 00	\$1,671,800 00	\$300,000 00
DEBT.				
Funded debt,	\$2,000,000 00	\$400,000 00	\$1,242,000 00	—
Unfunded debt,	837,224 94	171,072 05	84,145 60	\$114,409 51
TOTAL GROSS DEBT,	2,837,224 94	571,072 05	1,326,145 60	114,409 51
PERMANENT INVESTMENTS.				
Construction,	\$13,056,686 24	\$3,347,207 35	\$3,500,000 00	\$401,069 67
Equipment,	2,479,326 35	179,750 67	575,000 00	17,000 00
Other property,	1,901,306 91	273,107 08	—	13,000 00
TOTAL PERMANENT INVESTMENTS,	17,437,319 50	3,800,065 10	4,075,000 00	431,069 67
Cash and cash assets,	4,447,713 84	248,247 28	628,771 07	14,493 14
TOTAL PROPERTY AND ASSETS,	21,885,033 34	4,048,312 38	4,703,771 07	445,562 81
REVENUE FOR THE YEAR.				
From local passengers,	\$2,627,379 62	\$126,647 36	\$434,436 06	—
through passengers,	1,498,503 60	77,798 77	66,913 08	—
express and extra baggage,	282,461 50	16,585 25	21,058 41	—
mails,	170,316 81	5,868 31	3,893 68	—
other sources passenger department,	193,369 55	—	—	—
Total earnings passenger department,	4,772,031 08	226,899 69	526,301 23	—

From local freight,	966,370 70	171,681 26	412,938 84	\$73,218 07
through freight,	1,961,630 79	346,008 59	292,635 64	1,748 36
other sources freight department,	24,360 32	—	—	—
Total earnings freight department,	2,952,361 81	517,689 85	705,574 48	74,966 43
TOTAL TRANSPORTATION EARNINGS,	7,724,392 89	744,589 54	1,231,875 71	74,966 43
From rents for use of road,	—	—	—	—
all other sources,	165,816 39	37,389 35	38,952 58	847 00
TOTAL INCOME FROM ALL SOURCES,	7,890,209 28	781,978 89	1,270,828 29	75,813 43
EXPENSES.				
Transportation expenses,	\$5,274,709 84	\$439,025 17	\$788,021 51	\$47,875 01
Taxes,	359,497 15	49,844 02	43,829 42	2,231 67
TOTAL EXPENSES,	5,634,206 99	488,869 17	831,850 93	50,106 68
NET INCOME, DIVIDENDS, ETC.				
Net income,	\$2,256,002 29	\$293,109 70	\$438,977 36	\$25,706 75
Rents,	422,110 00	40,220 00	—	—
Interest accrued,	80,000 00	27,165 46	80,691 25	7,700 00
Dividends earned,	1,753,892 29	225,724 24	358,286 11	18,006 75
Per cent.,	11.3	8.7	11.9	6.0
Dividends declared,	1,550,000 00	207,824 00	262,500 00	19,500 00
Per cent.,	10.0	8.0	9.5	6.5
Balance for the year,	203,892 29	17,900 24	95,786 11	1,493 25†
Surplus last year,	3,343,916 11*	854,940 09	94,039 32	32,046 55
Surplus Sept. 30, 1887,	3,547,808 40	872,840 33	377,625 47†	31,153 30

* Includes \$25,000 received for sale of Tomlinson Bridge, and \$55,500.72
for net accretion of Sinking Fund.

† Including improvement account, \$187,800.04.
‡ Deficit.

	25. — NEW YORK, NEW HAVEN & HARTFORD — Con.	26. — NORWICH & WORCESTER — Con.	27. — PROVIDENCE & WORCESTER — Con.	28. — UNION FREIGHT — Con.
MILEAGE, TRAFFIC, ETC.				
Passenger-train mileage,	2,716,565	187,099	336,412	—
Freight-train mileage,	1,400,375	173,893	226,026	19,282
Total revenue-train mileage,	4,116,940	360,992	562,438	19,282
Switching-train mileage,	823,547	152,089	265,990	—
Other train mileage,	253,693	7,369	18,254	—
TOTAL TRAIN MILEAGE,	5,194,180	520,450	846,682	19,282
Number season-ticket passengers,	2,630,606	57,503	116,220	—
Number local passengers (including season),	8,358,413	489,329	2,803,959	—
Number through passengers, *	1,003,013	114,833	162,787	—
Total number of passengers carried,	9,361,426	604,162	2,966,746	—
Local passenger mileage,	174,416,689	5,802,145	21,063,763	—
Through passenger mileage, *	74,744,211	3,512,995	2,762,644	—
Total passenger mileage,	249,160,900	9,315,140	23,826,407	—
Tons of local freight carried,	855,093	215,792	497,602	248,986
Tons of through freight carried, *	1,747,064	420,237	490,867	6,985
Total tons of freight carried,	2,602,157	636,029	988,469	255,971
Local freight mileage,	28,171,340	7,455,539	13,193,237	242,355
Through freight mileage, *	121,874,368	12,524,333	14,440,814	10,477
Total freight mileage,	150,045,708	19,979,872	27,634,051	352,832
Av. rate of fare per mile, local pass'gers, { N. Y. div.,	2.00 cents.	2.18 cents.	2.17 cents.	—
through pass'gers, { Shore & Air Line,	2.50 "	2.21 "	2.42 "	—
season-ticket passengers,	2.13 "	0.87 "	0.69 "	—
ALL PASSENGERS,	1.77 "	2.20 "	2.10 "	—
Average rate of freight per mile, local freight,	3.43 "	2.30 "	3.12 "	2.13 cents.
through freight, *	1.61 "	2.76 "	2.02 "	1.66 "
ALL FREIGHT,	1.95 "	2.50 "	2.55 "	2.12 "

EQUIPMENT.

Number of locomotives,	•	•	•	•	•
passenger cars,	•	•	•	•	•
parlor and sleeping cars,	•	•	•	•	•
mail, baggage, and express cars,	•	•	•	•	•
freight cars (basis 8 wheels),	•	•	•	•	•
other cars,	•	•	•	•	•

GENERAL INFORMATION, ETC.

Total miles of road operated,	•	•	•	•	•
Same in Massachusetts,	•	•	•	•	•
Average number of persons employed,	•	•	•	•	•

133	17	39	4
276	16	53	—
40	—	—	—
95	3	14	—
2,933	510	1,179	—
60	—	14	—
265.36	66.40	50.41	2.431
5.87	18.60	26.01	2.431
5,591	445	886	37

* To and from other roads.

NARROW GAUGE ROADS.		29. — BOSTON, REVERE BEACH & LYNN.	30. — BOSTON, WINTHROP & SHORE.	31. — HOOSAC TUNNEL & WILMINGTON.*
CAPITAL STOCK.				
Amount paid in,	.	\$600,000 00	\$289,600 00	\$50,000 00
Number of stockholders,	.	342	53	25
Stockholders in Massachusetts,	.	318	52	23
Amount of stock held in Massachusetts,	.	\$540,400 00	\$282,100 00	\$47,500 00
DEBT.				
Funded debt,	.	\$350,000 00	\$246,000 00	—
Unfunded debt,	.	118,884 69	5,249 00	\$47,050 00
TOTAL GROSS DEBT,	.	468,884 69	251,249 00	47,050 00
PERMANENT INVESTMENTS.				
Construction,	.	\$677,603 70	\$403,259 55	\$95,000 00
Equipment,	.	220,095 09	6,500 00	—
Other property,	.	233,400 46	94,100 00	—
TOTAL PERMANENT INVESTMENTS,	.	1,131,099 25	503,859 55	95,000 00
Cash and cash assets,	.	27,363 32	41,543 94	—
TOTAL PROPERTY AND ASSETS,	.	1,158,462 57	545,403 49	95,000 00
REVENUE FOR THE YEAR.				
From local passengers,	.	\$215,986 44	\$18,324 70	\$1,705 64
through passengers,	.	4,492 50	4,288 45	—
express and extra baggage,	.	—	—	169 78
mails,	.	—	—	357 29
all other sources,	.	19,665 62	823 00	6,976 34
TOTAL INCOME FROM ALL SOURCES,	.	240,144 56	23,436 15	9,209 05

EXPENSES.			
Transportation expenses, .	.	.	.
Taxes, .	.	.	.
TOTAL EXPENSES, .	.	.	.
	\$141,010 86	\$13,475 63	\$9,209 05
	12,842 09	264 47	—
	153,852 95	13,740 10	9,209 05
NET INCOME, DIVIDENDS, ETC.			
Net income, .	.	.	.
Rents, .	.	.	.
Interest accrued, .	.	.	.
Dividends earned, .	.	.	.
Per cent., .	.	.	.
Dividends declared, .	.	.	.
Per cent., .	.	.	.
Balance for the year, .	.	.	.
Surplus last year, .	.	.	.
Surplus Sept. 30, 1887, .	.	.	.
	\$86,291 61	\$9,696 05	—
	25,276 51	—	—
	61,015 10	10,257 41	\$2,050 00
	—	561 36†	—
	39,000 00	—	—
	6.5	—	—
	22,015 10	561 36†	2,050 00†
	67,562 78	5,115 85	—
	89,577 88	4,554 49	2,050 00†

* This road in Massachusetts is illegally operated.

† Deficit.

NARROW GAUGE ROADS.		29. — BOSTON, REVERE BEACH & LYNN — Con.	30. — BOSTON, WINTHROP & SHORE — Con.	31. — HOOSAC TUNNEL & WILMINGTON — Con.
MILEAGE, TRAFFIC, ETC.				
Passenger-train mileage,		176,273	44,400	8,282
Other train mileage,		6,086	2,100	—
TOTAL TRAIN MILEAGE,		182,359	46,500	8,282
Number season-ticket passengers,		401,230	33,384	—
Number local passengers (including season),		2,081,178	282,523	—
Number through passengers*,		49,295	49,295	—
Total number of passengers carried,		2,130,473	331,818	—
Local passenger mileage,		11,202,440	66,913	42,641
Through passenger mileage*,		152,814	635,676	—
Total passenger mileage,		11,355,254	702,589	42,641
EQUIPMENT.				
Number of locomotives,		9	1	2
passenger cars,		39	3	4
mail, baggage, and express cars,		—	—	—
freight cars (basis 8 wheels),		4	—	29
other cars,		24	—	—
GENERAL INFORMATION, ETC.				
Total miles of road operated,		8.8	9.51	11.00
Same in Massachusetts,		8.8	9.51	8.00
Average number of persons employed,		125	10	16

* To and from other roads.

NARROW GAUGE ROADS.	32. — MARTHA'S VINEYARD	33. — NANTUCKET.	34. — WORCESTER & SHREWSBURY.
CAPITAL STOCK.			
Amount paid in,	\$40,000 00	\$95,000 00	\$36,825 00
Number of stockholders,	26	75	10
Stockholders in Massachusetts,	23	60	10
Amount of stock held in Massachusetts,	\$32,400 00	\$83,100 00	\$36,825 00
DEBT.			
Funded debt,	\$40,000 00	\$59,500 00	\$22,000 00
Unfunded debt.,	2,032 00	18,175 63	11,343 15
TOTAL GROSS DEBT,	42,032 00	77,675 63	33,343 15
PERMANENT INVESTMENTS.			
Construction,	\$91,512 09	\$156,904 67	\$54,403 07
Equipment,	14,086 00	14,413 18	40,010 73
Other property,	3,501 63	—	—
TOTAL PERMANENT INVESTMENTS,	109,099 72	171,317 85	94,413 80
Cash and cash assets,	837 22	1,730 68	400 59
TOTAL PROPERTY AND ASSETS,	109,936 94	173,048 53	94,814 39
REVENUE FOR THE YEAR.			
From local passengers,	\$5,056 30	\$5,927 80	\$29,569 01
through passengers,	—	—	—
express and extra baggage,	—	—	—
mails,	222 00	200 00	—
all other sources,	334 39	440 75	2,058 96
TOTAL INCOME FROM ALL SOURCES,	5,612 69	6,568 55	31,627 97

NARROW GAUGE ROADS.				32. — MARTHA'S VINEYARD — Col.	33. — NANTUCKET — Con	34. — WORCESTER & SHREWSBURY — Con.
EXPENSES.						
Transportation expenses, . . . . .	.	.	.	\$3,282 34	\$5,958 75	\$20,934 72
Taxes, . . . . .	.	.	.	34 47	19 90	283 46
TOTAL EXPENSES, . . . . .	.	.	.	3,316 81	5,978 65	21,218 18
NET INCOME, DIVIDENDS, ETC.						
Net income, . . . . .	.	.	.	\$2,295 88	\$589 90	\$10,409 79
Rents, . . . . .	.	.	.	—	—	—
Interest accrued, . . . . .	.	.	.	2,000 00	5,372 01	1,320 00
Dividends earned, . . . . .	.	.	.	295 88	—	9,189 79
Per cent., . . . . .	.	.	.	—	—	—
Dividends declared, . . . . .	.	.	.	—	—	—
Per cent., . . . . .	.	.	.	—	—	—
Balance for the year, . . . . .	.	.	.	295 88	4,782 11†	9,089 79
Surplus last year, . . . . .	.	.	.	27,609 06	5,155 01	15,556 45
Surplus Sept. 30, 1887, . . . . .	.	.	.	27,904 94	372 90	24,646 24
MILEAGE, TRAFFIC, ETC.						
Passenger-train mileage, . . . . .	.	.	.	6,298	10,538	35,071
Other train mileage, . . . . .	.	.	.	—	—	—
TOTAL TRAIN MILEAGE, . . . . .	.	.	.	6,298	10,538	35,071
Number season-ticket passengers, . . . . .	.	.	.	—	—	—
Number local passengers (including season), . . . . .	.	.	.	20,365	20,058	377,999
Number through passengers,* . . . . .	.	.	.	—	—	—
Total number of passengers carried, . . . . .	.	.	.	20,365	20,058	377,999
Local passenger mileage, . . . . .	.	.	.	147,647	220,638	1,133,997

LEASED ROADS,*	35. — ATTLEBOROUGH BRANCH, 1	36. — BERKSHIRE, 2	37. — CENTRAL MASSA- CHUSETTS, 3	38. — EASTERN, 4.	39. — FALL RIVER, 5
LIABILITIES.					
Capital stock,	\$131,700 00	\$600,000 00	\$7,313,324 00†	\$8,147,000 00†	\$200,000 00
Funded debt,	—	—	2,000,000 00	10,074,279 14	200,000 00
Unfunded debt,	—	245 07	—	920,978 63	62,717 86
Surplus Sept. 30, 1887,	781 21	14,274 55	—	1,215,895 45\$	18,885 57††
TOTAL LIABILITIES,	132,481 21	614,519 62	9,313,324 00	20,358,153 22	462,717 86
ASSETS.					
Construction,	\$131,416 48	\$600,000 00	\$9,313,324 00	\$14,497,655 26	\$443,832 29
Other property,	1,000 00	6,000 00	—	4,504,806 25	—
Cash and cash assets,	64 73	8,519 62	—	1,355,691 71	—
TOTAL ASSETS,	132,481 21	614,519 62	9,313,324 00	20,358,153 22	443,832 29
INCOME, EXPENSES, ETC., FOR THE YEAR.					
Total income from all sources,	\$9,219 00	\$42,441 08	\$51,500 00	\$1,309,001 77	\$12,534 05
Total expenses,	—	10,150 91	1,500 00	48,582 84	576 80
Net income,	9,219 00	32,290 17	50,000 00	1,260,418 93	11,957 25
Interest accrued,	—	—	50,000 00	746,477 17||	10,000 00
Dividends declared,	9,219 00	32,269 44	—	188,859 00	—
Per cent.,	7.0	5.37	—	**6.0	—
Balance for the year,	—	20 73	—	325,082 76	1,957 25

* Leased to and operated by the ¹ Boston & Providence, ² Housatonic of Connecticut, ³ Boston & Lowell, ⁴ Boston & Maine, ⁵ Old Colony.

† Including \$596,127.63 fund for redemption of mortgage debt.

‡ Includes \$100,000 paid Trustees of Sinking Fund.

§ On preferred stock only.

|| Deficit.

† Common, \$3,393,900; preferred, \$3,919,424.

‡ Common, \$4,997,600; preferred, \$3,149,400.

LEASED ROADS.*	40. — HOLYOKE & WESTFIELD 1	41. — LOWELL & ANDOVER. 2	42. — MILFORD, FRANKLIN & PROV- DENCE. †	43. — MONADNOCK. 3	44. — NASHUA & LOWELL. 4
LIABILITIES.					
Capital stock,	\$260,000 00	\$500,000 00	\$100,000 00	\$205,400 00	\$800,000 00
Funded debt,	260,000 00	178,000 00	—	48,500 00	300,000 00
Unfunded debt,	1,626 86	—	1,116 38	—	63,974 00
Surplus Sept. 30, 1887,	10,012 67	117,778 63	—	123,619 24	119,274 37
TOTAL LIABILITIES,	531,639 53	795,778 63	101,116 38	377,519 24	1,283,248 37
ASSETS.					
Construction,	\$522,268 89	\$754,695 94	\$101,116 38	\$367,701 26	\$691,292 07
Other property,	—	—	—	3,090 00	218,242 95
Cash and cash assets,	9,370 64	41,082 69	—	6,727 98	373,713 35
TOTAL ASSETS,	531,639 53	795,778 63	101,116 38	377,519 24	1,283,248 37
INCOME, EXPENSES, ETC., FOR THE YEAR.					
Total income from all sources,	\$26,699 65	\$53,293 32	—	\$16,500 00	\$88,549 99
Total expenses,	2,736 89	388 66	—	61 20	4,023 52
Net income,	23,962 76	52,904 66	—	16,438 80	84,526 47
Interest accrued,	17,600 00	10,728 34	—	2,533 89	18,392 79
Dividends declared,	9,100 00	35,000 00	—	4,000 00	68,000 00
Per cent.,	3.5	7.0	—	2.0	8.5
Balance for the year,	2,737 24†	7,176 32	—	9,904 91	1,866 32‡

* Leased to and operated by the ¹ New Haven & Northampton, ² Boston & Maine, ³ Cheshire, ⁴ Boston & Lowell.

† Operated by the Milford & Woonsocket R. R. Company upon terms not yet agreed upon.

‡ Deficit.

LEASED ROADS.*	43. — NASHUA & ACTON & BOSTON. 1	46. — NEWBURYPORT CITY. 2	47. — NORTH BROOKFIELD. 3	48. — PITTSFIELD & NORTH ADAMS. 4	49. — RHODE ISLAND & MASSA- CHUSETTS. 5
LIABILITIES.					
Capital stock,	\$500,000 00	\$97,000 00	\$100,000 00	\$450,000 00	\$100,000 00
Funded debt,	500,000 00	25,000 00	—	—	—
Unfunded debt,	492,482 90	—	—	—	19 00
Surplus Sept. 30, 1887,	429,194 29†	17,477 96	5,931 09	—	15,090 63
TOTAL LIABILITIES,	1,492,482 90	139,477 96	105,931 09	450,000 00	115,109 63
ASSETS.					
Construction,	\$1,057,031 20	\$122,128 33	\$105,456 79	\$450,000 00	\$112,321 13
Other property,	—	—	75 00	—	—
Cash and cash assets,	6,257 41	17,349 63	399 30	—	2,788 50
TOTAL ASSETS,	1,063,288 61	139,477 96	105,931 09	450,000 00	115,109 63
INCOME, EXPENSES, ETC., FOR THE YEAR.					
Total income from all sources,	—	\$6,728 66	\$3,146 12	\$22,500 00	\$10,000 00
Total expenses,	—	1,056 01	210 27	—	2,134 80
Net income,	—	5,672 65	2,935 85	22,500 00	7,865 20
Interest accrued,	\$30,000 00	1,750 00	—	—	—
Dividends declared,	—	3,152 50	3,000 00	22,500 00	15,000 00
Per cent.,	—	3.25	3.0	5.0	15.0
Balance for the year,	30,000 00†	770 15	64 15†	—	7,134 80†

* Leased to ¹ Concord of N. H., ² Eastern, and operated by the Boston & Maine, ³, ⁴ Boston & Albany, ⁵ New York & New England. † Deficit.

LEASED ROADS.*	50. — PROVIDENCE, WEBSTER & SPRING- FIELD 1	51. — SPENCER 1	52. — SPRINGFIELD & NEW LONDON. 2	53. — STOCKBRIDGE & PITTSFIELD 3	54. — STONY BROOK. 4
LIABILITIES.					
Capital stock,	\$135,000 00	\$50,000 00	\$198,145 00	\$448,700 00	\$300,000 00
Funded debt,	—	4,500 00	—	—	—
Unfunded debt,	56,282 65	—	29 50	812 75	—
Surplus Sept. 30, 1887,	3,586 94	8,360 35	341 48†	2,842 78	210 82
TOTAL LIABILITIES,	194,869 59	62,860 35	198,174 50	452,355 53	300,210 82
ASSETS.					
Construction,	\$192,157 69	\$62,854 43	\$187,805 52	\$448,700 00	\$276,601 19
Other property,	—	—	9,998 00	2,550 00	21,492 38
Cash and cash assets,	2,711 90	5 92	29 50	1,105 53	2,117 25
TOTAL ASSETS,	194,869 59	62,860 35	197,833 02	452,355 53	300,210 82
INCOME, EXPENSES, ETC., FOR THE YEAR.					
Total income from all sources,	\$4,672 69	\$3,321 65	\$4,143 15	\$31,647 00	\$20,000 00
Total expenses,	257 88	903 72	216 74	7,357 54	513 11
Net income,	4,414 81	2,417 93	3,926 41	24,289 46	19,486 89
Interest accrued,	3,382 18	241 87	—	66 97	—
Dividends declared,	—	2,750 00	3,980 13	24,195 14	19,500 00
Per cent.,	—	5.5	3.25	5.39	6.5
Balance for the year,	1,032 63	573 94†	53 72†	27 35	13 11†

* These roads are leased to and operated by the ¹ Boston & Albany, ² New York & New England, ³ Housatonic of Connecticut, ⁴ Boston & Lowell.

† Deficit.

LEASED ROADS.*	55. — VERMONT & MASSACHUSETTS, 1	56. — WAIR RIVER, 2	57. — WEST AMESBURY BRANCH, 3	58. — WEST STOCK-BRIDGE, 4	59. — WORCESTER, NASHUA & ROCHESTER, 3
LIABILITIES.					
Capital stock,	\$3,193,000 00	\$750,000 00	\$57,000 00	\$39,600 00	\$3,099,800 00
Funded debt,	1,000,000 00	—	57,000 00	—	1,408,500 00
Unfunded debt,	12,041 55	365,163 82	90 00	—	265,616 64
Surplus Sept. 30, 1887,	142,002 28	—	220 05	1,230 21	162,321 10†
TOTAL LIABILITIES,	4,347,043 83	1,115,163 82	114,310 05	40,830 21	4,833,916 64
ASSETS.					
Construction,	\$3,288,328 01	\$1,115,163 82	\$114,000 00	\$39,600 00	\$4,138,584 99
Other property,	261,233 64	—	—	400 00	415,336 03
Cash and cash assets,	211,274 01	—	310 05	830 21	117,674 52
TOTAL ASSETS,	3,760,835 66	1,115,163 82	114,310 05	40,830 21	4,671,595 54
INCOME, EXPENSES, ETC., FOR THE YEAR.					
Total income from all sources,	\$194,580 00	\$52,500 00	\$5,700 00	\$1,945 19	\$250,000 00
Total expenses,	3,000 00	—	523 17	329 45	3,354 20
Net income,	191,580 00	52,500 00	5,176 83	1,615 74	246,645 80
Interest accrued,	†	—	3,990 00	—	82,804 43
Dividends declared,	191,580 00	52,500 00	1,140 00	1,584 00	183,798 00
Per cent.,	6.0	7.0	2.0	4.0	6.0
Balance for the year,	142,002 28	—	46 83	31 74	19,956 63†

* These roads are leased to and operated by the ¹ Fitchburg, ² Boston & Albany, ³ Boston & Maine, ⁴ Housatonic of Connecticut.

† Interest paid by Fitchburg Railroad Company.

‡ Deficit.

	60. — CHELSEA BRANCH 1†	61. — DANVERS, 2‡	62. — HORN POND BRANCH 3	63. — CHATHAM, §
LIABILITIES.				
Capital stock,	\$21,000 00	\$67,500 00	\$2,000 00	\$66,195 00
Funded debt,	—	150,000 00	—	—
Unfunded debt,	17,310 52	26,956 02	—	—
Surplus Sept. 30, 1884,	—	—	13,238 46	—
TOTAL LIABILITIES,	38,310 52	244,456 02	15,238 46	66,195 00
ASSETS.				
Construction,	\$38,310 52	\$244,456 02	\$15,238 46	\$61,924 57
Other property,	—	—	—	—
Cash and cash assets,	—	—	—	4,270 43
TOTAL ASSETS,	38,310 52	244,456 02	15,238 46	66,195 00

† These roads are virtually owned by the ¹Eastern, and operated by the Boston & Maine, ²Boston & Maine, and their earnings and expenses are included in the returns of the operating roads.

³ Operated by the Boston & Lowell.

§ Road in process of construction.

	64. — NANTASKET BEACH.*	65. — NEWBURYPORT.†	66. — NEW YORK & BOSTON INLAND.‡	67. — OCEAN TERMINAL.‡
LIABILITIES.				
Capital stock,	—	\$220,340 02	\$139,960 00	\$2,000 00
Funded debt,	—	300,000 00	—	—
Unfunded debt,	—	77,046 31	17,862 12	—
Surplus Sept. 30, 1887,	—	—	—	—
TOTAL LIABILITIES,	—	597,386 33	157,822 12	2,000 00
ASSETS.				
Construction,	—	\$597,386 33	\$157,760 82	\$2,000 00
Other property,	—	—	—	—
Cash and cash assets,	—	—	61 30	—
TOTAL ASSETS,	—	597,386 33	157,822 12	2,000 00

* Road in the possession of the trustee for the bondholders, and not in operation during the past year.

† This road is virtually owned by the Boston & Maine, and its earnings and expenses are included in the return of that road.

‡ Obtained a certificate of incorporation but has not yet commenced the construction of its road.

TABULATED COMPARATIVE RESULTS
OF THE
CONDITION AND OPERATION
OF SEVERAL OF THE
RAILROAD CORPORATIONS OF THE STATE.

COMPILED FROM REPORTS.

TABULATED COMPARATIVE RESULTS OF RAILROAD CORPORATIONS.

RAILROADS	STOCK, DEBT AND COST PER MILE OF ROAD OWNED.					
	68. — Stock paid in.	69. — Net Debt.	70. — Total Stock and Net Debt.	71. — Construction.	72. — Equipment.	73. — Total Permanent Investments.
Boston & Albany,	\$65,677 13	\$28,654 52	\$94,331 65	\$83,575 27	\$10,329 04	\$95,827 54
Boston & Lowell,	56,370 68	55,972 23	112,342 91	73,859 18	13,102 89	130,910 42
Boston & Maine,	56,451 61	26,274 68	82,726 29	77,588 21	10,549 84	97,234 37
Boston & Providence,	62,743 13	18,389 12	81,132 25	74,923 50	3,253 23	82,952 45
Fitchburg,	74,081 96	49,583 76	123,665 72	112,631 73	10,187 63	124,670 35
New York & New England,	67,378 82	48,754 27	116,133 09	101,174 53	11,721 32	114,561 42
Old Colony,	24,517 84	21,565 09	46,082 93	39,873 73	4,720 76	48,235 71
Eastern,	68,554 36	81,113 81	149,668 17	121,993 06	12,183 01	159,899 54
Average,	\$55,522 22	\$38,267 31	\$93,789 53	\$81,299 28	\$9,139 64	\$97,261 33
Cheshire,	\$40,158 52	\$8,848 26	\$49,006 78	\$44,671 18	\$6,010 19	\$50,681 37
Connecticut River,	42,435 09	771 66	43,206 75	51,294 41	7,818 82	60,896 76
New Haven & Northampton,	19,316 84	30,749 75	50,066 59	44,366 22	7,159 65	52,314 04
New York, New Haven & Hartford,	110,163 47	—	110,163 47	99,205 96	17,621 37	123,932 62
Norwich & Worcester,	39,222 89	4,861 82	44,084 71	50,409 75	2,703 83	57,229 89
Providence & Worcester,	40,593 33	13,834 05	63,427 38	69,430 47	11,406 47	80,837 14
Average,	\$56,857 69	\$11,039 92	\$67,897 61	\$64,201 59	\$9,928 76	\$77,111 73
Average 14 Roads,	\$55,787 91	\$32,335 65	\$88,123 56	\$77,549 25	\$9,307 04	\$92,841 29

Tabulated Comparative Results of Railroad Corporations — Continued.

RAILROADS.	EARNINGS AND EXPENSES PER MILE ROAD OPERATED.				EARNINGS AND EXP. PER TOTAL REVENUE TRAIN-MILE.		
	74. — Total Transportation Earnings.	75. — Operating Expenses.	76. — Net Earnings.		77. — Total Transportation Earnings.	78. — Operating Expenses.	79. — Net Earnings.
Boston & Albany.	\$21,918 36	\$15,076 30	\$6,842 06	.	\$1,628	\$1,120	\$0,508
Boston & Lowell.	5,842 36	4,048 05	1,794 31	.	1,225	.849	.376
Boston & Maine.	12,953 39	8,032 45	4,920 94	.	1,584	.982	.602
Boston & Providence.	27,767 10	25,466 71	2,300 39	.	1,802	1,652	.150
Fitchburg.	12,412 78	9,551 45	2,861 33	.	1,417	1,090	.327
New York & New England.	10,587 84	7,251 27	3,336 57	.	1,202	.823	.379
Old Colony.	10,012 86	7,223 09	2,789 77	.	1,730	1,248	.482
Average.	\$11,580 58	\$8,113 97	\$3,466 61	.	\$1,541	\$1,080	\$0,461
Cheshire.	\$10,072 31	\$6,643 87	\$3,428 44	.	\$1,093	\$0,721	\$0,372
Connecticut River.	11,768 84	7,999 81	3,769 03	.	1,914	1,301	.613
New Haven & Northampton.	4,720 83	3,782 82	938 01	.	1,326	1,002	.264
New York, New Haven & Hartford.	29,109 11	19,877 56	9,231 55	.	1,876	1,281	.595
Norwich & Worcester.	11,213 70	6,611 83	4,601 87	.	1,432	.844	.588
Providence & Worcester.	24,437 13	15,632 25	8,804 88	.	2,192	1,402	.790
Average.	\$17,312 43	\$11,759 39	\$5,553 04	.	\$1,796	\$1,220	\$0,576
Average 13 Roads.	\$12,619 80	\$8,774 91	\$3,844 89	.	\$1,598	\$1,111	\$0,487

Tabulated Comparative Results of Railroad Corporations — Continued.

RAILROADS.	EXPENSES PER TOTAL TRAIN MILE.							
	\$0. — Repairs of Road.*	\$1. — New Rails.	\$2. — Repairs of Bridges.	\$3. — Repairs of Locomo- tives.	\$4. — Fuel.	\$5. — Oil and Waste.	\$6. — Repairs of Passenger, Baggage and Mail Cars.†	\$7. — Repairs of Freight and other Cars.‡
Boston & Albany,	\$0.1211	\$0.0148	\$0.0154	\$0.0789	\$0.1141	\$0.0099	\$0.1365	\$0.2012
Boston & Lowell, . . . . .	.1184	.0094	.0240	.0373	.1001	.0073	.0477	.0851
Boston & Maine, . . . . .	.0973	.0125	.0323	.0458	.0817	.0046	.0862	.1327
Boston & Providence, . . . . .	.1452	.0160	.0809	.0822	.1069	.0153	.1086	.1537
Fitchburg, . . . . .	.1116	.0171	.0085	.0435	.0933	.0046	.0646	.1401
New York & New England, . . . . .	.1194	.0206	.0153	.0681	.1045	.0039	.0510	.1341
Old Colony, . . . . .	.1593	.0109	.0315	.0508	.0870	.0066	.1063	.1950
Average,	\$0.1200	\$0.0139	\$0.0239	\$0.0554	\$0.0973	\$0.0067	\$0.0864	\$0.1503
Cheshire,	\$0.0567	\$0.0051	\$0.0148	\$0.0502	\$0.1539	\$0.0104	\$0.1033	\$0.0567
Connecticut River, . . . . .	.2579	.0156	.0549	.0375	.1120	.0064	.0569	.1988
New Haven & Northampton, . . . . .	.2609	—	.0266	.0567	.0956	.0099	.0805	.1346
New York, New Haven & Hartford, . . . . .	.1370	.0054	.0110	.0376	.0751	.0062	.1010	.1491
Norwich & Worcester, . . . . .	.0761	.0298	.0112	.0607	.0989	.0038	.0550	.1790
Providence & Worcester, . . . . .	.1039	.0218	.0414	.0808	.0906	.0044	.1493	.1445
Average,	\$0.1429	\$0.0088	\$0.0188	\$0.0497	\$0.0886	\$0.0065	\$0.0976	\$0.1369
Average, 13 roads,	\$0.1252	\$0.0127	\$0.0228	\$0.0541	\$0.0954	\$0.0067	\$0.0890	\$0.1475

* Including cost of new ties.

† Per passenger train mile.

‡ Per freight-train mile.

Tabulated Comparative Results of Railroad Corporations — Continued.

RAILROADS.	REPAIRS.			AVERAGES, ETC.			
	88. — Per Locomotive.	89. — Per Passenger, Baggage and Mail Car.	90. — Per Freight Car.	91. — Per Passenger: Average Distance travelled.	92. — Per Ton of Freight: Average Distance carried.	93. — Average No of Passengers per Train Mile.	94. — Average No. of Tons of Freight per Train Mile.
Boston & Albany,	\$1,897 25	\$1,047 59	\$92 08	17.9	110.5	84	138
Boston & Lowell,	989 63	399 33	35 88	13.4	59.5	42	89
Boston & Maine,	1,157 34	581 50	47 32	13.1	49.0	72	87
Boston & Providence,	1,464 03	461 00	37 73	9.3	28.4	78	91
Fitchburg,	1,015 81	459 66	40 26	14.7	81.8	46	169
New York & New England,	1,548 96	334 00	43 11	11.6	68.6	52	132
Old Colony,	1,367 82	658 93	62 08	17.4	35.6	83	88
Average,	\$1,352 02	\$582 26	\$54 92	14.2	69.4	66	119
Cheshire,	\$1,119 03	\$471 68	\$52 16	29.5	55.2	34	92
Connecticut River,	710 68	372 15	53 79	10.2	23.4	50	113
New Haven & Northampton,	1,449 99	682 96	66 17	17.2	50.3	26	105
New York, New Haven & Hartford,	1,466 84	667 98	69 73	26.6	57.7	92	107
Norwich & Worcester,	1,856 42	541 76	61 06	15.4	31.4	50	115
Providence & Worcester,	1,754 55	748 77	27 38	8.0	28.0	71	122
Average,	\$1,474 17	\$637 65	\$57 53	20.5	45.3	77	107
Average 13 Roads,	\$1,375 59	\$595 35	\$55 41	15.4	63.0	68	117

Tabulated Comparative Results of Railroad Corporations — Concluded.

RAILROADS.	95. — Passenger Earnings.	96. — Freight Earnings.	97. — Total Transportation Earnings.	98. — Operating Expenses.	99. — Net Earnings.	100. — Per cent Operating Expenses to Trans. Earnings.
Boston & Albany,	\$4,023,451 19	\$4,493,588 15	\$8,517,039 34	\$5,858,348 99	\$2,658,690 35	69
Boston & Lowell,	2,310,806 16	2,895,842 89	5,206,649 05	3,607,581 78	1,599,067 27	69
Boston & Maine,	4,685,570 84	3,207,061 70	7,892,632 54	4,894,249 22	2,998,383 32	62
Boston & Providence,	1,236,661 80	644,615 07	1,881,276 87	1,725,420 89	155,855 98	92
Fitchburg,	1,565,184 33	2,707,543 69	4,272,728 02	3,287,800 96	984,927 06	77
New York & New England,	1,534,923 11	2,485,912 85	4,020,835 96	2,753,741 94	1,267,094 02	68
Old Colony,	2,772,798 59	1,995,923 61	4,768,722 20	3,440,067 05	1,328,655 15	72
Cheshire,	202,316 97	442,411 62	644,728 59	425,274 39	219,454 20	66
Connecticut River,	443,588 37	496,153 16	939,741 53	638,784 57	300,956 96	68
New Haven & Northampton,	245,309 31	571,442 65	816,751 96	654,466 22	162,285 74	80
New York, New Haven & Hartford,	4,772,031 08	2,952,361 81	7,724,392 89	5,274,709 84	2,449,683 05	68
Norwich & Worcester,	226,899 69	517,689 85	744,589 54	439,025 17	305,564 37	59
Providence & Worcester,	526,301 23	705,574 48	1,231,875 71	788,021 51	443,854 20	64

COMPARISON OF RETURNS

1886 with 1887,

AND

SUMMARY TAKEN FROM RETURNS

OF

1881-1882-1883-1884-1885-1886-1887.

Summary taken from the Returns of 1886 and 1887.

	1886.	1887.	Increase.	Decrease.
<i>Roadway.</i>	Miles.	Miles.	Miles.	Miles.
Length of road and branches, .	2,867.613	2,992.823	125.210	-
in Massachusetts, .	1,989.508	2,018.258	28.750	-
Length of double track, .	1,011.367	1,036.717	25.350	-
in Massachusetts, .	733.919	740.389	6.470	-
Length of sidings, .	1,249.862	1,360.009	110.147	-
in Massachusetts, .	892.676	964.330	71.654	-
Total length as single track, .	5,128.842	5,389.549	260.707	-
in Massachusetts, .	3,616.103	3,722.977	106.874	-
Length of steel rails in track, .	3,573.910	3,903.167	329.257	-
Length of iron rails in track, .	1,554.932	1,586.382	31.450	-
Total miles of road operated, .	3,778.387	4,131.884	353.497	-
in Massachusetts, .	1,988.879	2,051.504	62.625	-
Railroad crossings at grade, .	39	39	-	-
over grade, .	19	19	-	-
under grade, .	19	19	-	-
Highway crossings at grade, .	2,138	2,128	-	10
protected, .	738	765	27	-
unprotected, .	1,400	1,363	-	37
<i>Assets.</i>				
Construction,	\$178,013,772 71	\$207,600,619 30	\$29,646,846 59	-
Equipment,	22,465,263 04	22,743,981 34	278,718 30	-
Lands,	2,552,865 50	2,634,545 11	81,679 61	-
Stocks,	7,509,923 65	8,374,339 26	864,415 61	-
Bonds,	1,319,627 07	1,064,525 12	-	\$255,101 95
Other property,	2,392,617 55	2,400,478 60	7,861 05	-
Total permanent investments, .	\$214,254,069 52	\$244,878,488 73	\$30,624,419 21	-
Cash,	\$4,034,413 04	\$3,585,665 42	-	\$448,747 62
Materials and supplies,	3,533,332 41	4,500,050 34	\$966,717 93	-
Sinking fund,	2,731,089 42	3,562,112 50	831,023 08	-
Other cash assets,	12,161,740 03	14,813,098 27	2,651,358 24	-
Total cash and cash assets, . .	\$22,460,574 90	\$26,460,926 53	\$4,000,351 63	-
Profit and loss balance (deficit),	1,682,947 64	2,213,493 17	530,545 53	-
Total assets as per balance-sheet,	\$238,397,592 06	\$273,552,908 43	\$35,155,316 37	-
<i>Liabilities.</i>				
Capital stock,	\$130,687,969 02	\$150,469,414 02	\$19,781,445 00	-
Funded debt,	80,216,499 55	92,944,254 06	12,727,754 51	-
Unfunded debt,	13,256,572 84	15,162,767 07	1,906,194 23	-
Surplus,	14,236,550 65	14,976,473 28	739,922 63	-
Total liabilities as per balance-sheet,	\$238,397,592 06	\$273,552,908 43	\$35,155,316 37	-
Total number of stockholders, .	38,876	39,705	829	-
in Massachusetts, .	28,478	29,806	1,328	-
Stock held in Massachusetts, .	\$84,734,764 02	\$92,728,240 02	\$7,993,476 00	-
Persons employed,	31,188	35,300	4,112	-

Summary taken from the Returns of 1886 and 1887.

	1886.	1887.	Increase.	Decrease.
<i>General Exhibit for the Year.</i>				
Total income,	\$49,315,820 50	\$53,650,438 27	\$4,334,617 77	—
Total expense, including taxes,	32,372,939 74	36,662,910 59	4,289,970 85	—
Net income,	16,942,880 76	16,987,527 68	44,646 92	—
Rentals,	3,514,299 44	3,754,593 33	240,293 89	—
Interest accrued,	4,810,019 68	4,880,612 85	70,493 17	—
Dividends earned,	8,618,561 64	8,352,421 50	—	\$266,140 14
per cent.,	6.70	5.55	—	1.15
Dividends declared,	6,857,506 30	7,550,901 61	693,395 31	—
per cent.,	5.33	5.02	—	0.31
Balance for the year,	1,761,055 34	801,519 89	—	959,535 45
Surplus Sept. 30,	12,553,603 01	12,762,980 11	209,377 10	—
<i>Transportation Earnings.</i>				
From local passengers,	\$15,773,723 12	\$17,009,841 66	\$1,236,118 54	—
through passengers,	5,401,602 23	5,950,080 34	548,478 11	—
express and extra baggage,	1,280,947 06	1,398,039 81	117,092 75	—
mails,	686,738 42	703,493 14	16,754 72	—
other sources,	188,314 88	224,281 74	35,966 86	—
Total passenger department,	\$23,331,325 71	\$25,285,736 69	\$1,954,410 98	—
From local freight,	\$10,929,413 10	\$11,621,372 13	\$691,959 03	—
through freight,	11,852,778 57	13,034,633 12	1,181,854 55	—
other sources,	55,171 86	126,916 40	68,744 54	—
Total freight department,	\$22,840,363 53	\$24,782,921 65	\$1,942,558 12	—
Total transportation earnings,	46,171,689 24	50,068,658 34	3,896,969 10	—
Transportation expenses, including taxes,	\$32,892,265 58	\$37,280,008 88	\$4,387,743 30	—
<i>Mileage, Traffic, etc.</i>				
Train miles, passenger,	17,268,159	18,522,488	1,254,329	—
freight,	12,303,808	13,057,794	753,986	—
Total revenue-train miles,	29,571,967	31,580,282	2,008,315	—
Miles run by other trains,	6,869,076	7,810,797	941,721	—
Total train miles,	36,441,043	39,391,079	2,950,036	—
Passengers, season ticket,	10,810,716	11,104,632	293,916	—
total number,	75,842,581	82,923,364	7,080,783	—
local mileage,	865,354,544	956,475,256	91,120,712	—
through mileage,	258,793,501	285,555,822	26,762,321	—
total mileage,	1,124,148,045	1,242,031,078	117,883,033	—
Freight, total tons carried,	22,925,532	24,605,140	1,679,608	—
local mileage,	411,259,886	432,270,692	21,010,806	—
through mileage,	980,366,552	1,085,661,320	105,294,768	—
total mileage,	1,391,626,438	1,517,932,012	126,305,574	—
<i>Equipment.</i>				
Locomotives,	1,445	1,550	105	—
Passenger cars,	2,058	2,191	133	—
Mail, baggage and express cars,	518	564	46	—
Freight cars (basis 8 wheels),	31,319	34,200	2,881	—

Summary taken from *Returns of 1881, 1882, 1883, 1884, 1885, 1886, 1887.*

	1881.	1882.	1883.	1884.	1885.	1886.	1887.
Main line in Massachusetts, .	1,927,944	1,949,460	1,953,258	1,973,708	1,981,088	1,989,508	2,018,258
Double track in Massachusetts, .	480,877	539,070	587,299	667,889	699,639	733,919	740,389
Sidings in Massachusetts, .	739,285	768,195	799,264	832,393	855,300	892,676	964,330
Total in Massachusetts, .	3,148,106	3,256,725	3,339,803	3,473,990	3,536,627	3,616,103	3,722,977
Amount of capital stock, .	\$122,155,614 12	\$122,976,262 26	\$122,367,472 27	\$127,668,390 27	\$128,551,658 54	\$130,687,969 02	\$150,469,414 02
Amount of stock held in Mass., .	80,813,841 82	80,692,561 35	81,477,470 02	83,332,908 02	85,434,154 02	84,734,764 02	92,728,240 02
Number of stockholders, .	26,354	37,284	38,275	39,205	39,440	38,876	39,705
Stockholders in Massachusetts, .	26,485	27,282	27,827	28,513	28,532	28,478	29,806
Gross debt, .	\$79,340,124 56	\$89,251,046 03	\$91,235,835 97	\$91,752,883 99	\$93,782,585 30	\$93,473,072 39	\$108,107,021 13
Net debt, .	64,850,890 76	71,913,806 00	72,933,290 93	74,439,473 75	73,706,622 04	71,012,497 49	81,646,094 60
Cost of construction, .	\$159,664,120 10	\$163,724,377 54	\$165,824,300 96	\$176,899,373 56	\$177,392,457 66	\$178,013,772 71	\$207,660,619 30
Cost of equipment, .	18,795,188 80	19,410,331 13	20,122,551 63	22,041,997 09	22,680,642 08	22,465,263 04	22,743,981 34
Cost of other property, .	11,404,816 30	15,821,119 87	12,954,424 16	12,940,503 89	13,612,864 16	13,775,033 77	14,473,888 09
Total permanent investment, .	189,864,125 20	198,955,828 54	198,901,276 75	211,881,874 51	213,683,963 90	214,254,069 52	244,878,488 73
Cash and cash assets, .	14,489,233 80	17,337,240 03	18,302,545 01	17,313,410 24	20,075,963 26	22,460,574 90	26,460,926 53
Total property and assets, .	204,353,359 00	216,293,068 57	217,203,821 79	229,195,284 78	233,761,927 16	236,714,644 42	271,339,415 26
Total income from all sources, .	\$37,764,595 83	\$40,846,370 10	\$43,380,387 63	\$43,119,302 70	\$44,623,350 35	\$49,315,820 50	\$53,650,438 27
Total expense,* .	27,062,644 23	29,944,167 15	32,479,907 71	32,070,684 51	32,504,375 47	35,887,239 18	40,417,503 92
Net income, .	10,701,951 60	10,902,202 95	10,900,479 92	11,048,618 19	12,118,974 88	13,428,581 32	13,232,934 35
Interest accrued, .	3,748,292 55	4,291,222 59	4,756,085 23	4,729,328 56	4,767,095 88	4,810,019 68	4,886,512 85
Dividends earned, .	6,953,459 05	6,610,980 36	6,144,394 69	6,319,289 63	7,351,879 00	8,618,561 64	8,352,421 50
Percentage to capital stock, .	5.69	5.37	5.02	4.95	5.72	6.70	5.55
Dividends declared, .	6,287,866 82	6,271,139 86	6,379,721 10	6,535,054 92	6,551,704 15	6,857,506 30	7,550,901 61
Per cent., .	5.15	5.10	5.21	5.12	5.10	5.33	5.02
Balance for the year, .	665,592 23	339,840 50	235,326 41 ^d	215,765 29 ^d	800,174 85	1,761,055 34	801,519 89
Total surplus Sept. 30, .	2,857,620 32	4,065,760 28	3,600,413 55	9,774,010 52	11,427,683 32	12,553,603 01	12,762,980 11

Taxes paid,	\$1,508,020 91	\$1,830,437 00	\$1,878,200 01	\$2,021,559 81	\$2,063,204 62	\$2,106,565 25	\$2,502,129 12
Mileage, passenger trains,	12,413 290	13,636 169	14,244 658	15,157 425	16,212 988	17,268 159	18,522 488
Mileage, freight trains,	10,398,539	10,598,126	11,882,154	11,282,338	11,722,667	12,363,808	13,057,794
Mileage, other trains,	4,393,954	4,818,505	5,324,011	5,861,770	6,233,344	6,869,076	7,810,797
Total train mileage,	27,205,783	29,052,800	31,150,823	32,304,333	34,168,999	36,441,043	39,391,079
Total passenger mileage,	788,422,761	892,321,207	943,245,658	1,007,136,376	1,041,628,073	1,124,148,045	1,242,031,078
Through passenger mileage,†	219,680,579	242,970,014	240,784,477	1,245,506,939	245,334,025	258,793,501	285,555,822
Total freight mileage,	1,080,802,796	1,130,070,652	1,229,824,418	229,368,472	1,266,160,455	1,391,626,438	1,517,932,012
Through freight mileage,†	760,09,637	777,203,347	822,282,988	870,891,828	887,168,408	980,366,552	1,085,661,320
Total passengers carried,	49,834,491	55,868,694	61,530,747	66,517,265	69,603,700	75,842,581	82,923,364
Total tons of freight carried,	17,971,072	19,061,164	20,202,881	20,273,920	20,577,096	22,925,532	24,603,140
Total season-ticket passengers,	12,616,987	12,674,117	12,769,420	11,436,929	10,694,750	10,810,716	11,104,632
Number persons employed,	25,490	27,403	29,844	30,590	30,069	31,188	35,300
Locomotives,	1,161	1,222	1,286	1,391	1,416	1,445	1,550
Passenger cars,	1,568	1,658	1,790	1,948	1,993	2,058	2,191
Mail and baggage cars,	432	463	482	525	509	518	564
Freight cars,	24,502	26,382	28,008	29,701	29,957	31,319	34,200
Steel rails,	2,134,964	2,466,203	2,774,431	3,121,720	3,336 476	3,573 910	3,903,167
Iron rails,	2,304,306	2,109,232	1,943,138	1,836,857	1,703,546	1,554,932	1,586 382

* Including operating expenses, taxes and rents.

† Mileage to and from other roads.

‡ Deficit.

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